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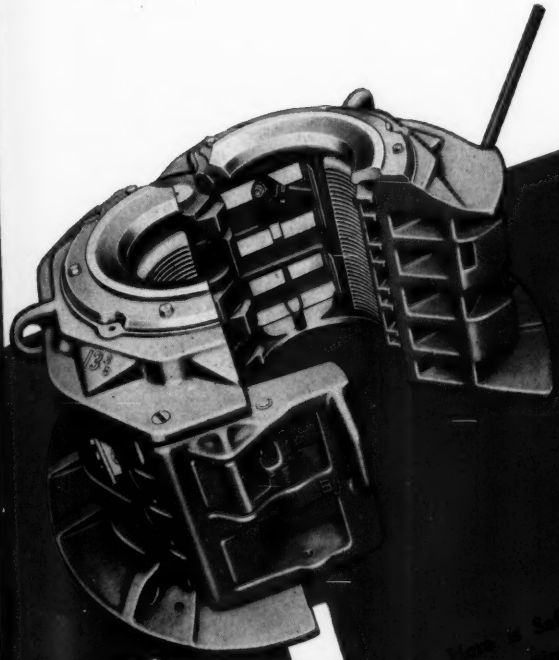
CALIFORNIA

OIL WORLD

TWICE MONTHLY • SECOND ISSUE • JANUARY, 1944



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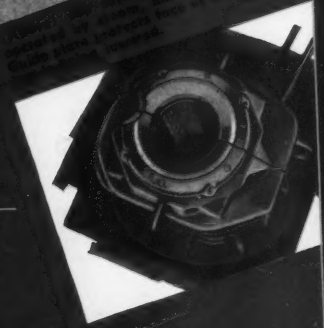

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and Petroleum Industry

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Editorial

The St. Louis *Post Dispatch* recently published an editorial entitled "Why Not an Oil Subsidy?"

Many thoughtful California oil men have groped for a conclusive answer to the question, not being entirely satisfied with the generalization that a subsidy is un-American, or unworkable.

Russell Brown has written an able answer to the editorial setting forth the failure of subsidies in Great Britain and Canada, and supporting the principle, in war time, that "stability of prices has been subordinate to the maintenance of the flow of supplies. A controlled rise rather than unchanging prices has been the objective for many commodities". Mr. Brown says, in effect, that price incentives are needed to build and maintain our petroleum reserves. He adds "It is not inflation to increase price to obtain increased production of essential materials".

But the question *can* be categorically answered. This is the answer: A subsidy to an established and going industry, (not a public utility nor a fabricator of new or special war commodities) is a step toward government monopoly.

If the administration delivers taxpayers' money to a hazardous industry, it will be a *bad* government if it fails to protect the taxpayer by imposing such price controls as will insure a return of the money. But it will be a *worse* government if it does do so. Control of the purse strings controls the industry dependent thereon.

If government sets a pot of gold out for the oil industry, government will dictate when and where the operator may drill; how deep he must drill; when he must abandon; and how much he must sell his oil for. Such a control of prices would not be an "agreement" between units of industry; it would be an imperative order, given by the holder of the purse strings. The Sherman Anti-Trust law could not reach the guilty party.

Government has indicated the tenor of its conscience in such matters, in the case of public land oil leases. While with one hand forbidding the operators to raise the competitive price of the oil produced, with the other hand it demands a higher price for *its* royalty share of the oil.

Government has given subsidies to agriculture. Its "subsidy men" have followed the taxpayers' money into the farmers' kitchens. They have dictated when and where the farmer must plant. They have dictated which lands must lie fallow. They have been able to say "do as we tell you, or else". *That is a monopoly.*

Do we want government subsidy men sitting in our offices, dictating geology to our geologists, production methods to our petroleum engineers and prices to our comptrollers? *That would also be a monopoly.*

The subsidy men could raise the subsidy to $1.00 per barrel, and reduce the price of oil to 25 cents per barrel. This would cut prices to non-subsidy operators, and bring them to ruin, ending in complete government monopoly.

Which is worse — industrial monopoly, or government monopoly? The adage, "Beware of Greeks bearing gifts" goes deeper than the story of the Trojan horse.

To accept government gold is to give up free enterprise. To accept gifts entails the obligation to obey orders. Regimentation and free enterprise cannot exist side by side.

The word subsidy comes from the Latin "subsidere" meaning to sit down—to lie in wait. Truly an ambush is prepared for us, and we must continue to be on our guard.

"Reprinted from the January, 1944, Issue of The Independent OIL PRODUCER, published by the Oil Producers Agency, Los Angeles."

Carrington Kung

Reports From Washington

New confusion over the gasoline rationing problems of the West Coast sprang up this month, with Washington authorities agreeing upon one point only: Reductions must be made, if motorists want to keep their cars out of storage.

Simultaneous with reports that Deputy Petroleum Administrator Ralph K. Davies and Price Administrator Chester Bowles felt that A coupons should be maintained at their present levels, Col. Bryan Houston, Deputy Administrator of the Office of Price Administration, in charge of rationing, indicated that A-book holders who do not possess B or C books would be the first to suffer when the war effort gathers momentum.

Houston, en route to California, was quoted as saying he believed "we can get through until summer or later without cutting A, B and C allotments" but he expressed the belief that A coupons might have to be dropped altogether in the middle West and on the West Coast if the European war lasted into fall.

Officials of the Petroleum Administration for War believe that the OPA will have to exercise greater control over the issuance of coupon books if the situation is to be saved. Otherwise, PAW will have to ration the area "through stock-exhaustion" . . . In other words, if the OPA does not take a more realistic view of the situation and trim its coupon-issuance to fit the allocations made by PAW, the motoring public will wake up some day to find that—tickets or no tickets—there is no more gasoline.

Davies would like to see A coupons throughout the country stabilized at three gallons. Admittedly, however, the East (now having to make its three-gallon A coupons last twice as long and thereby receiving only approximately 1½ gallons per coupon) is not in a position to use its A coupons to the extent they can be used in other parts of the country. Bowles is understood to favor stablization of the value of A coupons,—which made the Chicago statement of Col. Houston even more surprising to Washington observers.

In Davies' opinion, lavish distribution of gasoline coupons should be curbed as the first step in remedying the present heavy overconsumption in California. Otherwise, he told CALIFORNIA OIL WORLD, a reduction in B and C cards should be effected. The A coupons, he believes, should be left intact—as much for the purposes of morale as for anything.

Designation of additional service stations to cater to workers in important war industries also may be necessary, Davies said. Some California service stations already have been dedicated to the task of filling the gasoline tanks of war workers,—a measure which has been resorted to fairly extensively in this part of the country.

* * *

Concern over the lack of concern shown by California motorists in the growing gasoline shortage crisis is not the only reason for the pained expressions Washington petroleum officials are wearing. The crude oil price situation is more worriesome than ever, with Economic Stabilization Director Fred S. Vinson remaining adamant in his decision to force subsidies on the industry, in lieu of a price boost.

Vinson recently bawled out PAW and the Petroleum Industry War Council for not finding "practical substitutes" for a price increase, in a recent "extremely sarcastic letter" to Petroleum Administrator Ickes, this writer was told. Reportedly he found PAW's insistence on a general price increase "disappointing but not entirely surprising".

In the letter he informed PAW and PIWC that he would "call as well upon the OPA" to study the question and submit recommendations.

While the letter was dated January 5, OPA evidently lost no time in making its survey. A subsidy proposal will be offered Vinson in the very near future by the Price Administration, so the petroleum industry might just as well get ready for the bad news.

The OPA's suggestion will involve special bonuses or subsidies for various "distressed" segments of the industry, according to hints from OPA officials. Presumably, separate subsidy arrangements will be proposed for stripper wells, new production, secondary recovery projects and other isolated operations. The program, CALIFORNIA OIL WORLD was told, probably would not be administered by OPA but would be turned over to a "permanent agency,—such as the Reconstruction Finance Corp."

Vinson's approval of any subsidy suggestion offered by OPA is virtually a foregone conclusion. About all the oil industry can hope for is Congressional intervention.

With the Disney bill (passed by the House) under consideration by the Senate Banking and Commerce Committee, and the Senate Interstate and Foreign Commerce also interested in the legislation establishing a floor under crude prices, some oil men believe there is a good chance for a public airing of their difficulties . . . Almost all oil men are in agreement that any subsidy program will be unworkable and that—should the OPA's recommendation be placed in operation—it would not take long to establish this fact.

In this connection, Russell B. Brown, general counsel for the Independent Petroleum Association of America and one of the most ac-

tive crusaders for an overall price increase, expressed the hope that Congress would rescue the industry from any well-meaning but impractical subsidy program.

"Any subsidy plan I have any inkling of will be unworkable," Brown stated. "But I am willing to study the new proposal with an open mind."

Since OPA was created by Congress, Brown predicted that members of the House and Senate would keep an eagle eye on any suggestions from that agency affecting oil prices.

The explosion over the $134,000,000 Canol project occurred when the Truman investigating committee came forth with its Jan. 9 report denouncing the costly venture has pretty well died down. Unless some new evidence is unearthed, there probably will be no further hearings, a committee investigator declared, and the Army presumably will carry out its plans to complete the project.

Since the contents of the report are no longer news, and space is limited we will have to content ourselves with a very brief resume:

The Senate group's rebuke to Lt. Gen. Brehon Somervell that his insistence on the project in the face of warnings from qualified engineers that it was impractical was "inexcusable" seemed amply warranted by the 44-page study of Canol's history. Although the report expressed sympathy with the General's "hasty decision" to develop oil potentialities along the Alcan Highway at a time when the Japanese were a real threat to the Pacific seaboard and Alaska, the feeling of the committee was that the project should have been abandoned when this threat was removed.

Here are a few highlights: (1) The project—undertaken without engineering advice and without consultation with any of the other Government departments—was to have been completed by Oct. 1, 1942. Actually, it will not start operation until late spring of this year.

(2.) Transportation of 124,367 tons of materials, plus all of the supplies necessary to maintain from 10,000 to 12,000 civilian workers, was required for Canol's construction. The pipeline used more than 16,000 tons of new steel and the Whitehorse refinery 7,787 tons . . . A tanker can be constructed with about 5,000 tons of steel, and the report estimated that the cost of a tanker to transport oil products to Alaska and a distribution and storage system to include 931,000 barrels of 100 octane gasoline would have been $44,456,509.

"When the Whitehorse refinery starts operations in the spring or summer of 1944, it will take 65 months, or more than five years of year-round operation to produce an equivalent amount of 100 octane gasoline," the report commented.

(3.) If 6-inch pipe had been used instead of 4-inch, the number of pumping stations could have been reduced from 12 to two. After the Army made this "belated discovery", a substitution of more than 100 miles of 6-inch pipe was made, the report stated, making possible a reduction in the number of stations to 10.

(4.) The refinery installed at Whitehorse originally was the Bareco refinery at Corpus Christi, Tex., which was dismantled and shipped across the continent at considerable expense. Official protest was made by Ickes because removal of the refinery interferred with the 100 octane program, the report noted.

These are only a few of the criticisms voiced by the Truman committee in its report. Repeated warnings from Imperial Oil Co. Ltd., Canadian subsidiary of Standard Oil Co. (N.J.), with whom the War Department entered into a contract, and by Standard Oil Co. of California—official consultant—that the project was unfeasible; could not possibly be completed within the time-limit set and be replaced by a program of transportation and storage of 100 octane at far less cost, apparently were completely disregarded.

Commenting on Gen. Somervell's inability to answer questions asked by its members, the Truman group said:

"The committee is not satisfied with his explanation of the absence of a single memorandum of fact or factual study or even a notation of figures relating to this $134,000,000 project. The committee has never seen a similar situation in either government or business."

* * *

Difficulties of the Navy Department and Standard of California over the plan for joint operation of Standard's Elk Hills deposits were taken up by the House again after the holiday recess. On Jan. 18, the House Public Lands Committee resumed hearings after a silence of several months . . . the House Naval Affairs Committee is expected to reopen its hearings on the matter very shortly,—probably to consider legislation drafted by the Navy which would give Congressional sanction to the Navy-Standard contract.

At this time, it is too early to hazard any guesses as to the outcome. The Navy's argument for a contract was outlined to the Public Lands committee by Admirable H. A. Stuart, director of Navy Petroleum Reserves. Both the Navy Department and Standard are banking heavily on the hope that members of Congress will recognize the need for continued production at Elk Hills—now being carried on by Standard at the rate of 15,000 barrels daily under an interim agreement—to meet increasing military demands for oil.

Proponents of a "business agreement", under which the Navy would control the Elk Hills field and Standard would handle production for a share of the oil, found a ray of hope in the fact the Public Lands group postponed action on a resolution by Representative James O'Connor, of Montana, providing for Government condemnation of the Standard holdings . . . No premature rejoicing is being done, however, as neither the Public Lands nor the Naval Affairs committee has yet been convinced that condemnation proceedings would not be the simplest way out.

* * *

The Petroleum Industry War Council had a busy time at its January meeting; found itself in "substantial accord" with PAW's Foreign Operations Committee on the establishment of a foreign oil policy for this country; listened to grave warnings from Petroleum Administrator Ickes on the world oil situation and set up a committee of petro-

(Continued on Page 31)

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Oil Shale a Source of Petroleum Products

With a new year ahead it is timely to realize that the future ability of the petroleum industry to produce enough oil to meet the demands of U. S. industry and the American motoring public is receiving constant attention. The present huge demand for petroleum products is of course due to the war and, in many areas—notably in California—this demand has brought about the consumption of about three barrels of oil for every barrel estimated in reserve. Post-war industrial demands will undoubtedly be large and some form of lend-lease aid to war-torn allied countries will probably be extended by the U. S. during the reconstruction period.

Several magazine articles have appeared recently which draw the uneasy conclusion that the American petroleum industry is approaching a crisis in its ability to supply petroleum products. Present war demands explain the difficulty until the end of the conflict. But the added question remains as to how much time will elapse in the post-war period before a critical supply problem exists. Crude oil imports from South America has been suggested as a solution, but this does not answer the question about the future of a self-contained U. S. oil industry.

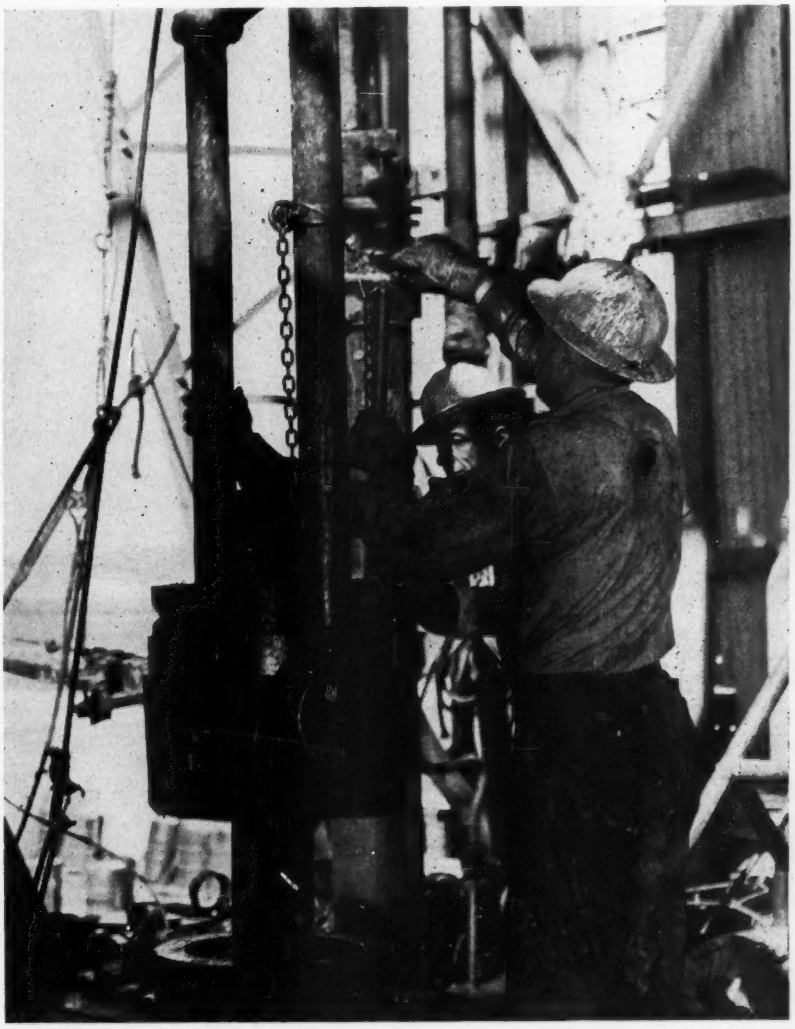
While the nation is still in the throes of a Second World War it is indeed cynical to consider the possibility of another war. But the fact remains that within the realm of human circumstances the possibility of World War III exists. If another conflict becomes a reality 15 or 20 years in the future it is obvious that petroleum products will be the key to military power. It therefore becomes necessary for the American producer and refiner to ever keep this possibility in mind.

The problem of assuring an adequate future supply of petroleum products is receiving attention in many quarters—not only in terms of the more efficient production and utilization of crude oil; but also in terms of manufacturing petroleum products in other ways. Among the sources of raw material for the potential augmentation of a diminishing supply of crude oil is oil shale. It is therefore of interest to review a few facts about American oil shale as a source of petroleum products.

What is oil shale?

Geologists explain that oil shale is a compact, laminated rock of sedimentary origin which contains carbonaceous matter which yields oil when the shale is heated in retorts under the right conditions. Strangely enough, "oil shale" does not contain liquid petroleum in the sense that the oil can be extracted by the use of liquid solvents. In order to obtain any kind of yield of liquid containing petroleum hydrocarbons, shale must be heated to a temperature which brings about the cracking, or decomposition, of the waxy, carbonaceous substance it contains. When this is accomplished a liquid is obtained which can be subjected to refining processes common to the petroleum industry.

Oil shale may be thought of in a practical sense as being a sort of second cousin to coal. It has been pointed out that the line of demarkation between coal and shale has never been sharply drawn. One authority states that a rough practical distinction lies in the fact that coal, when burned, burns to an ash—while the residual matter from



Men at work in the oil fields are "Backing the Attack."

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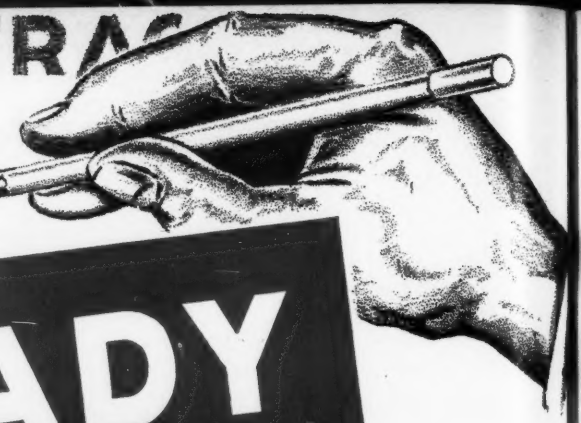

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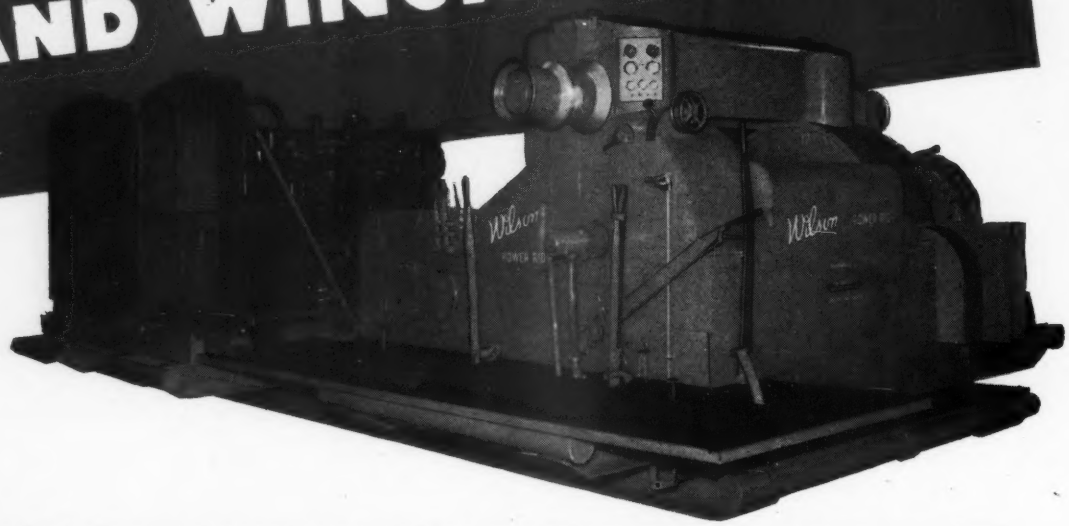

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burned shale remains as a lump. Material which yields less than 33% ash has also been thought of to be more like a coal. Shale yields a high percentage of ash.

Physical Composition of Oil Shale

Government data indicate that conclusions drawn from the microscopic examination of samples from various parts of the world outline five divisions which describe the physical composition of oil shales. First: shales contain very small carbonized, or partly carbonized fragments of plants. Second: more or less spherical bodies, yellow, or reddish-yellow in color, are observed which are regarded as algae, grains of resinous materials, or globules of an oily substance. Third: irregular streaks of unidentified reddish-yellow and dark brown material. Fourth: shells of small cructaceans and parts of the skeletons and scales of small fish. And fifth: mineral matter such as grains of sand and crystals of iron pyrites.

Geological analysis supports the belief that there is little evidence to conclude that animal life had much to do with the formation of the oily part of shales. The animal remains are thought to contribute to the nitrogen and sulfur which are present.

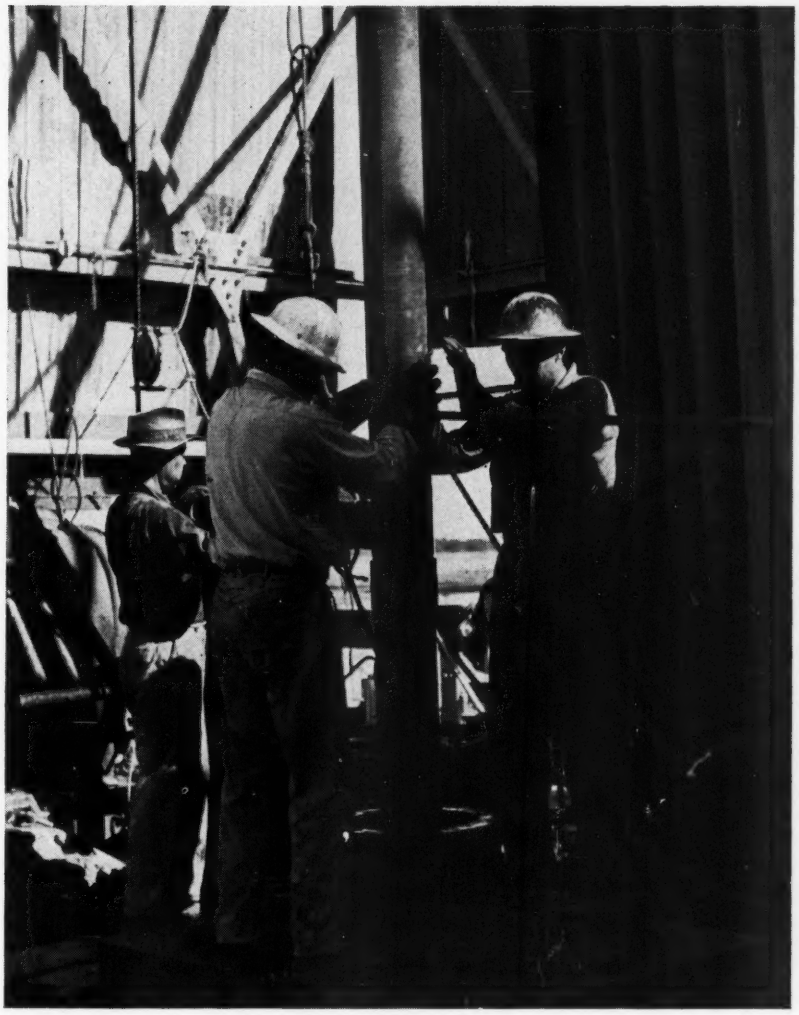
It is further believed that the yellowish globules, together with the yellowish or brown (often nearly black streaks, are the sources of the oil obtained when the shale is heated, and are probably of vegetable origin. Upon microscopic examination some shales show show little organic matter, while others indicate considerable. All degrees of gradation are known to exist between the two extremes.

Chemical Nature of the "Oily" Part of Shale

When oil shale is heated in a retort, the carbonaceous matter it contains is broken down or "cracked" with the formation of a distillate exhibiting the properties of a petroleum distillate. The exact chemical nature of what it is that breaks down is somewhat indefinite, but it is believed to be of a large and complicated molecular structure. One authority has named the oil-yielding substance kerogen, a term derived from two Greek words meaning "producer of wax."

A careful analysis of shale kerogen from different sources indicates it to have a general molecular composition consisting of six parts of carbon, 10 parts of hydrogen and one part of oxygen. This molecular relationship of carbon, hydrogen and oxygen is then believed to be multiplied many times to represent the complex linkage of the kerogen particles to each other. The composition of the kerogen is not believed to be the same for all shales, nor that the kerogen from any one shale is a definite chemical compound.

Oil shale also contains varying amounts of nitrogen, which can be recovered as a by-product fertilizer, iron pyrite, gypsum, and combined sulphur. When oil shale is heated, a great deal of hydrogen sulphide is usually given off.



When casing goes down hole both investment and effort are nearing the oil return for which it was expended.

Location of U. S. Oil Shales

According to government surveys, oil shales occur in many parts of the United States. The most important deposits, from an economic standpoint, occur in the States of Colorado, Nevada, Utah and Wyoming. The richest of these are reportedly in the Rocky Mountain region and belong to the Green River formation of the Eocene age. The shales of Nevada are believed to be younger than those of Green River, while most of the Montana shales are believed to be older.

Geologically, the California shales

Heavy tools are coming out of retirement to help alleviate the oil shortage.

are not thought of as true oil shales, and are classified as being of the Miocene age. Black shales exist throughout the eastern states of Illinois, Missouri, Indiana, New York, Kentucky, Ohio, Pennsylvania, and Tennessee.

Rocky Mountain Oil Shales

The oil shales of the Green River formation occur in Garfield, Mesa, and Rio Blanco Counties, northwestern Colorado; in Unita, Sweetwater, and Lincoln Counties, southwestern Wyoming; and in Unita, Duchesne, Carbon, and Wasatch Counties, northeastern Utah.

Government surveys have indicated that the Green River formation consists mostly, but not wholly, of shale. Some of the shale does not yield oil, and much of it is of too low a grade, or is not in thick enough beds to be of economic importance. In Colorado the Green River formation reaches a maximum thickness of about 2,600 feet. The middle part of the formation reportedly contains most of the oil shale, the upper and lower parts being practically barren.

The Colorado Green River oil shales lie practically horizontal, except for occasional local displacements and foldings, and appear to be uniform in thickness and yield. At least two workable beds, yielding over 25 gallons of oil per ton have been found wherever the formation has been examined. The rich-oil-shale strata are from a few inches to over 30 feet in thickness, and are interstratified with lean shales, barren shales, sandstone, limestones, conglomerate, and thin-bedded oolites.

The oil-yielding shales usually outcrop high on the sides of steep-walled canyons and are darker in color and more resistant to weathering than the barren beds. Their altitude above sea level ranges from 6,000 to 8,000 feet. Some of the shale beds have yielded up to 90 gallons of oil per ton of shale, but most indications point to the probability that the Green River formation contains enough shale of workable thickness to supply an enormous amount of material from which a yield of 35 gallons of oil per ton could be obtained for many years. Such shales are also described as yielding up to 20 pounds of ammonium sulphate fertilizer per ton.

Oil shale occurs in other parts of the world, notably in Scotland, England, France and Australia. Probably the most progress in the processing of oil shale has been made by the Scottish industry.

Recovery of Oil from Oil Shale

Technologists believe that the oil-producing substance kerogen, as contained in shale, does not crack directly into a hydrocarbon distillate; but rather that, when the shale is heated the kerogen first changes to bitumen. The bitumen, in turn, is broken down to form the hydrocarbon distillate which resembles a petroleum distillate. The temperature at which the kerogen changes to bitumen is not well understood, and the cracking temperature for obtaining the best yield of oil from a given shale varies with each type. In a practical sense the recovery of shale oil consists simply in heating the shale, under controlled conditions, to the point where the cracking of the oil-producing bitumen occurs and recovering the resulting gas, and oil vapors. This has been accomplished in various ways by the use of retorts of different designs.

The Shale Retort

The basic principle applied in recovering shale oil is to heat the ground material (usually to 10 mesh) in such a fashion as to enable a continuous operation to take place, with economy in utilizing the heat applied. A great many devices have been invented for carrying out the heating; but probably few exist which would enable continuous shale-heating on a large scale. At present the U. S. shale oil industry is virtually non-existent. Soon after World War I considerable interest was shown in shale oil recovery, and one or two oil companies did considerable work with California diatomaceous shales; but the rapid discovery of large oil pools together with the advent of cracking stills soon brought the shale investigations to an end in favor of the booming petroleum industry.

Government studies have reported that shale may be retorted in several different ways. Cylindrical retorts with a worm screw drive have been used, the screw conveying the ground shale up through the cylinder against increasing temperature.

Another form is the rectangular retort. This consists of a flat hearth, heated from below, and covered with a top arranged to lead the oil vapors to the delivery pipes. The crushed shale is fed to the hearth by a screw conveyor. The feed end of the hearth is generally the coolest part, with the temperature increasing progressively toward the discharge end. The shale is moved across the hearth and discharged from the retort by mechanized rakes, toothed conveyors, or other similar devices. The spent shale is then discharged under a water seal.

Other types consist of retorts inclined at various angles, with some sort of conveyor system, while another is designed to operate vertically. Different methods of applying heat range from continuous or intermittent external heating to continuous internal heating. Most of the rotary cylindrical retorts, according to government studies, resemble cement clinkering kilns and are designed to operate continuously. They are externally heated, and are usually inclined about 15 degrees from horizontal. The retort is set in a furnace and rotated by a gear drive. Ground shale is fed at the cooler, higher end and passes downward through the retort and out at the lower end. The rotation of the retort, sometimes supplemented by vanes or spiral baffles, causes the shale to move downward at a uniform rate. Provision can be made for taking the oil vapors off at several points.

Much still remains to be done on shale retort development.

TABLE I
PROPERTIES OF SHALE GASOLINE
(Egloff, Hubner and Van Arsdell)

	Manchurian	Australian	Esthonian	Spanish	So. African	Swedish	French
Gravity, ° A.P.I.	59.2	63.9	52.7	60.0	58.7	46.4	55.2
IBP °F.	95	99	102	98	108	106	94
10%	143	136	165	148	162	218	157
20%	178	162	198	178	198	252	201
50%	270	220	270	240	257	307	294
90%	362	320	361	330	321	364	368
End point	391	368	393	388	355	402	391
Octane No. A.S.T.M.—MM	61	75	73	67	71	89	72
Octane No. Research Method	64	68	..	74	71	89	72
Copper dish gum mgs/100 ccs	452	..	1163	..	205	276	217

Refining Shale Oil

Shale oil lends itself readily to the refinery procedures commonly applied to petroleum stocks, but requires especial care due to the high percentage of unsaturated and gum-forming fractions present. Under modern refining processes the unsaturated hydrocarbons could become valuable charging stocks for catalytic conversion into chemical combinations of commercial value.

After retorting, shale yields crude shale oil, gas, and ammonia liquor. Distillation of the crude oil yields a naphtha, crude distillate and coke. The naphtha can then be treated with sulphuric acid and caustic soda, and distilled to recover a finished naphtha stock which can be fractionated into stocks of different gravities and boiling points.

The crude distillate can also be treated with sulphuric acid, neutralized with caustic soda, and distilled. Usually two cuts are made, one to recover a crude burning oil; and a second which yields a heavy oil containing paraffin wax. The crude burning oil is acid-treated, neutralized, and distilled into fractions ranging from kerosene stock to light gas oil.

The heavy oil can be chilled and filtered, or solvent-refined to remove the wax and the recovered oil fractionated into gas-oil and lubricating oil cuts.

The gas from the retorts can be scrubbed with water to remove any residual ammonia and then put through a conventional vapor recovery process to obtain various cuts of finished naphtha.

Complete data are not avaiable on the distillation characteristics of U. S. shale gasoline, but Table I gives tests on foreign products which are indicative of what may be obtained.

Future Development Dependent Upon Many Factors

The beginning of a U. S. shale oil industry after World War I were soon obscured by the rapid discovery of oil fields. For the past 20 years little has been done.

If the future should demand attention anew many formidable problems must be met. In addition to the application of vastly improved mechanical devices and refining processes, large capital investments managed through free enterprise are necessary to assure the best industrial development. U. S. shale deposits,though tremendous in size, are not inexhaustible and necessitate efficient utilization.

Nineteen years ago government estimates placed the probable investment necessary for a shale oil plant at approximately $3,000 per barrel of shale oil daily capacity. Under present and future conditions such a figure might have to be increased several times.

Shale-mining requires the working of deposits in steep canyons at elevations from 5,000 to 8,000 feet in elevation. Conveyors, grinders and other mechanical handling equipment must preceed the charging of

(Continued on page 32)

McCullough
GUN PERFORATOR
COMPLETION METHODS
Brown Line Print No. 4

Set Thru

THEN PERFORATE & TEST THE DESIRED ZONES IN SUCCESSION

Set the casing through the oil and gas zones and cement the string solid. Then, with the McCullough Gun Tester, test the desired zones quickly and economically.

Perforating and testing of each zone is accomplished *with a single run of the tubing*. The zones are tested in succession, beginning with the upper zone and working downward. No plugs or squeeze jobs are required between tests. Careful pipe measurements are used to assure location of the perforations in the EXACT ZONE DESIGNATED, and an accurate guage of the productiveness of each zone is obtained because it is *tested immediatetly after perforating* and while it is under formation pressure only.

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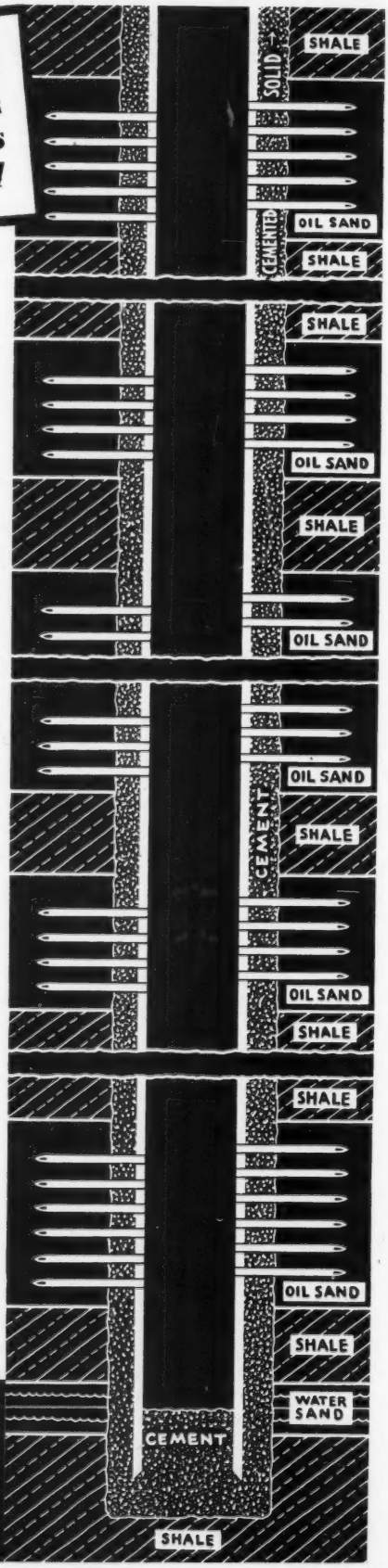

20 SERVICE LOCATIONS

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HOUSTON, TEXAS	TYLER, TEXAS	SHREVEPORT, LA.	CASPER, WYO.
WICHITA FALLS, TEXAS	McALLEN, TEXAS	HOUMA, LA.	LOS ANGELES, CALIF.
VICTORIA, TEXAS	ALICE, TEXAS	LAKE CHARLES, LA.	VENTURA, CALIF.
CORPUS CHRISTI, TEX.	MAGNOLIA, ARK.	OKLA. CITY, OKLA.	BAKERSFIELD, CALIF.
GEO. WEST, TEXAS	NEW IBERIA, LA.	SEMINOLE, OKLA.	AVENAL, CALIF.

Silencers for Diesel and Gas Engine Compressor Sets

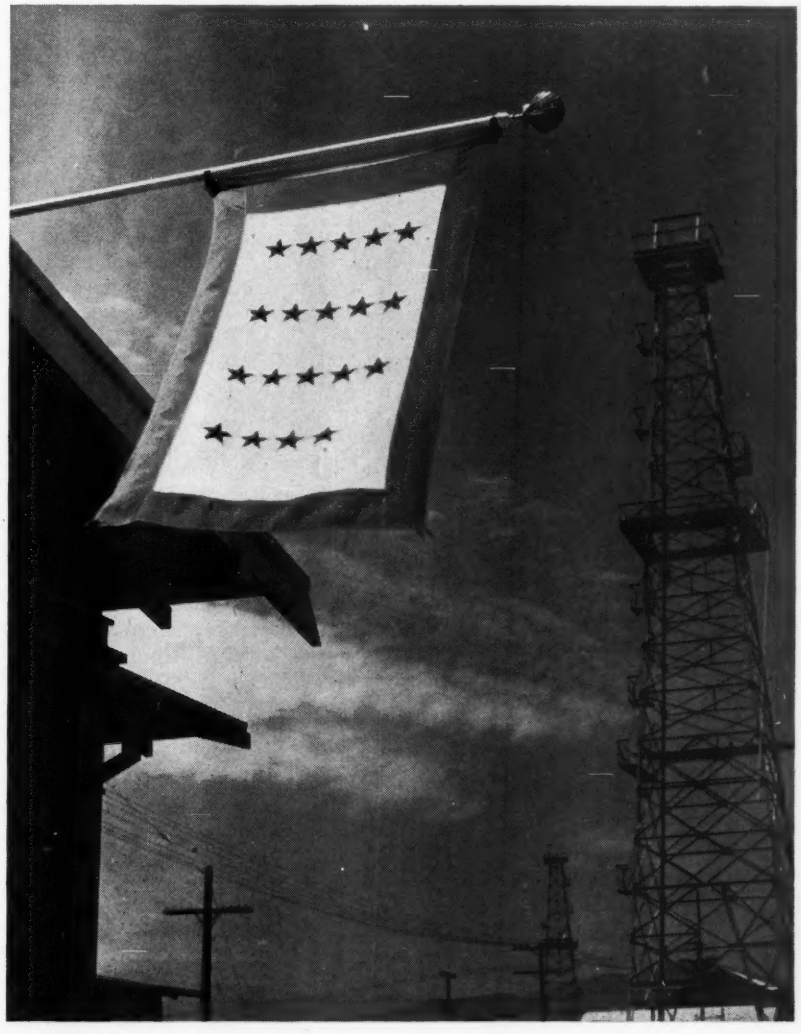
By
R. B. BOURNE

Director of Research—
Maxim Silencer Company
Read at CNGA
January 6, 1944, Meeting by
M. L. Arnold, Richfield Oil Corp.

The problem of satisfactorily silencing the exhaust of an internal combustion engine or the intake of a reciprocating compressor can be solved only by a complete knowledge of the nature of the problem. Before describing silencers in detail, suppose we discuss the noise problem and some of the factors which have to be taken into account in the design of a suitable exhaust system.

When an exhaust valve opens or a port is uncovered, there is a sudden release of gas under pressure into the exhaust system, which, being an acoustic system having mass, elasticity and resistance may be shock excited into oscillation. The frequency and intensity of the oscillations thus produced depend on the intensity of the initial surge and the physical dimensions of the exhaust system. Many of the oscillations produced are of audible frequency and of sufficient intensity to be annoying. Each individual explosion produces a whole train of sound waves, much like the effect of opening a bottle of champagne. If the explosion frequency of the engine is so related to the natural frequencies of the exhaust system, these sound waves may be vastly re-inforced. In addition to the sounds thus created, there exist also a number of high intensity, high frequency noises in the form of transients, which we might call "bang" noises. These transients which accompany the initial surge of exhaust gas may be of sufficient intensity to strike heavy mechanical blows on the side of piping and silencers which sound just like that. More than one silencer has been suspected of having loose parts rattling around its insides. We call this effect "shell noise." Of course, an exhaust line explosion as such may actually wreck a silencer if it is not strong enough to withstand such abnormal pressures. One other thing deserves mention at this point. A heavy surge traveling down an exhaust line will change the shape of its wave front in such a manner that, after a certain distance, the rise in pressure at a given point may be practically instantaneous. It is much like a water wave breaking on the beach. Shell noise is at its worst when this condition obtains.

How quiet must the final exhaust or intake be? It all depends on what the neighborhood will stand. Satisfactory noise conditions range all the way from those demanded by the hypersensitive lady who is acutely conscious of the fall of a pin, to those accepted by the roving engineer who "likes the sound of it." In some cases there may be no audible noise at all, yet sub-audible sound waves or pulsations may be present in sufficient strength to cause secondary effects such as the rattling



The stars on this flag have multiplied since this shot was made—just another reason that the industry should be proud for its record made in the face of constantly diminishing man-power.

of windows, dishes, etc., and the shaking of buildings. It must be admitted that this latter condition may be serious. Often, the engine itself sets up vibrations in the ground which may travel considerable distances and affect houses or other buildings. These cases are sometimes very difficult to pin down, since the frequencies present in the ground are generally the same as those which are air-borne.

In any event, the local conditions generally determine how good the silencing must be to be satisfactory. Low frequency sounds may carry considerable distances and when they encounter a receptive local condition such as a nicely turned alleyway or courtyard, these waves may be considerably amplified. The intensity may be increased to a point where there is a sensation of pain and discomfort. Speech may be modulated. What happens then is that the vocal chords are forcibly vibrated at the frequency externally present. The whole body vibrates and one instance is recalled where the effect was strong enough to blur the vision. Two unusual cases come to mind. A man lived across the street from the local ice plant where the diesels were pretty well quieted. No sound from them could be heard in his yard. Nevertheless, he stated that his bedroom was most uncomfortable when the plant was running. Investigation disclosed that his window was equipped with the old-fashioned side catches whereby the window was either closed, partly open or fully opened. He always opened this window to the first stop, Under these conditions, the side of the opening together with the volume of the room conspired to form a good resonator nicely tuned to a practically sub-audible frequency escaping the exhaust. He was sleeping in a resonator! The other bedroom story concerns a lady who had a standing wave pattern in her house. The points of maximum pressure happened to be so arranged that one of them was right at the head of her bed! Standing alongside the bed, nothing could be heard. I was asked to lie down on the bed and sure enough — the lady was right. She had temporarily solved the difficulty by sleeping with her head at the footboard. In both these cases, the trouble was cleared up without difficulty. Steady recurrence of a noise is generally much more annoying than random noises of much greater intensity.

Many attempts have been made to specify the degree of silencing required or the noise level acceptable. Of course, we can easily measure sound levels with a portable meter which reads the answer directly in DECIBELS. I slipped in this cabalistic term on purpose so as to explain and debunk it. Slick specification writers have pounced on it and mangled it until its own mother wouldn't recognize it. It is, as a matter of fact, an extremely useful concept when understood and not abused. Let's see what it's all about. It so happens that the range of intensities in commonly encountered sounds is extraordinarily great. The human ear can just about detect differences in sound energy of two to one. It's response to sound stimulation is approximately logarithmic, not arithmetic. We could make an instrument which would read sound pressures in pounds per square inch, if we wanted to. The sound pressure in this room, for instance, can be measured but the answer in pounds per square inch would be a meaningless small number. We are much more at home with numbers greater than one than with small decimals. Furthermore, we don't like to have numbers too large to grasp. Imagine having to say that the sound energy in here right now is one million two hundred fifty thousand times ten to the minus sixteen watts per square centimeter! Who would have guessed it? How much simpler to say, instead, its sixty to db?

Well, then, where are we? The average human ear can just detect a sound level of ten to the minus sixteen watts per square centimeter. A simple logarithmic concept, which gives us numbers easy to grasp and which more or less follows the sensation of sound by the ear, solves the whole mystery. The DECIBEL is a logarithmic ratio between the sound to be measured and that tiny level I mentioned a minute ago. It is not an absolute quantity at all, but common usage has more or less made it so. So when we say a sound has 70 db we imply that it is 70 db above the threshold of hearing. For those interested in the formula, the number of decibels corresponding to the ratio of two sounds having energies W_1 and W_2, is ten times the logarithm to the base ten of the ration W_1 over W_2. If sound pressures are used, the number of db is twenty times this logarithm, instead of ten.

Now there are some other little matters that deserve consideration. Suppose the sound level of an exhaust pipe, measured ten feet off the end of the pipe is 90 db. Will it be offensive? It depends on where the listener is and what other noises and their quality and intensity are present. If the listener resides in a sound level of 90 db, he probably won't be much aware of another noise of 90 db being thrust upon him. Of course, the exhaust noise falls off pretty fast with distance, so that by the time it has travelled a couple of hundred feet, it's level may be down to say seventy db. We have encountered cases where exhaust pipes were terminated right outside a window with people inside. In such cases, the silencer must not permit the escape of noise much above sixty or seventy db. If the window is in a room full of boiler makers on double time, obviously the noise reduction requirements of the silencer might be slightly modified! A silencer giving about 20 db noise reduction will fulfill the requirements of most installations.

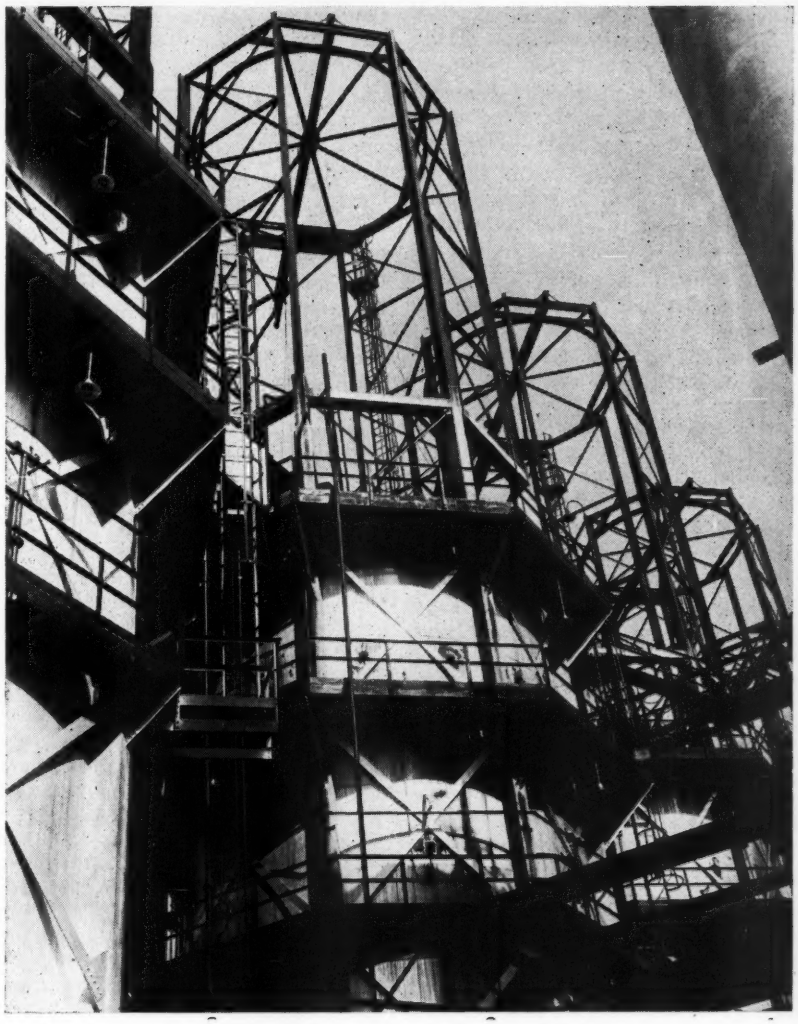
Now, of course, there is much more to silencing an engine than just reducing its noise. After all, we have to allow the engine to run! If we could get away with a cork driven snugly into the end of the exhaust pipe, it would effect all the silencing demanded by the most finicky neighbor. But, alas! It would impose high BACK PRESSURE on the engine. So here is the number two bogey, right out in the open.

Any device or pipe through which gas passes offers a certain opposition to its flow. It is said to have back pressure. The products of combustion have to be moved out of the way in order to make room for one of the same an instant later. In general, it is desirable to have the back pressure of the system as low

as possible, consistent with good noise reduction and a not too large silencer. High back pressure is said to burn up exhaust valves, stick rings, increase fuel consumption, and to give the maintainance man a headache. Right here, let me say that the only back pressure the gas in an engine cylinder is worried about is that obtaining just outside his front door when he is about to dash out through the valve opening or port, as the case may be. It is of no concern that there may be high back pressure somewhere else in the system, just so he can get out in an efficient manner.

Well, that brings us right down to the business of measuring back pressure. How is it done? It is very simple. All you have to do is to hook a manometer on the exhaust system and there is the back pressure read directly off a scale in inches of water or mercury as the case may be. If this gives the right answer, the job is said to be o.k. Oh yes, if it happens to read quite low, nobody bothers to inquire why. Engine builders are in the habit of specifying a maximum back pressure at the manifold of their engines. These requirements can be and are met. They also specify sometimes how much pressure drop may be tolerated through the silencer. To check this, a manometer is hooked in on both sides of the silencer and the reading taken. Now, there is a little more to this business of measuring back pressure than meets the eye.

In the first place. it is not too easy to tap into an exhaust pipe and lead off a connection to a manometer without incurring an error due to the velocity of the gas through the pipe. If a burr is left in the pipe when drilling and tapping is done, the reading may be either high or low depending on where the burr is and how big it is. On the upstream side of the hole, it may create a suction due to turbulence created and the reading will be low. A burr on the downstream side will act as a scoop and create a false pressure. Sometimes the connection is made on the outside of an elbow. A component of the gas velocity hits the open end of the tube and the gage reads too high.



Today's equipment must be maintained and operated at peak efficiency for replacements will continue to be scarce.

Most engine exhaust systems are oscillatory in character. Some two cycle gas and diesels engines depend on exhaust tuning for efficient operation. It can be said that practically all exhaust gas and intake flow to reciprocating and rotary compressors is oscillatory in character. In addition there may be heavy surges. We have seen manometers read negative pressure in an exhaust system running at full load. Surges travelling down the exhaust pipe will reflect from the end of the pipe and from a silencer and set up standing wave systems along the length of the system. The pattern of these standing waves can readily be ascertained by experiment, either with suitable electrical gear or with the manometer! But these wave patterns are similar to alternating currents. Sometimes their intensity is greater than the pressure due to steady flow. Under these conditions, how can a "direct current" instrument like a manometer be expected to register alternating current? Or at least an alternating pressure super-imposed upon a steady or D.C. pressure. The answer is—it can't. Some of you may be in a position to try an experiment in your plants. A succession of manometer readings taken every foot along a fairly long exhaust pipe will show that the apparent pressure in the line is a variable with distance along the line. Allowing for a normal steady flow drop the readings may follow a fairly good sine curve. The points of maximum pressure will be found to be

where maximum changes of pressure in the standing wave system occur. The manometer will read lowest at points where the pressure changes are least and where the alternating acoustic velocity is highest. It may be said that exhaust systems involving high rates of gas flow suffer from this effect to a less degree than those of low rates of gas flow. In other words, the higher the resistance of an exhaust system, the less important is the standing wave system from the point of view of erroneous manometer readings.

Apart from this, there is another little gem to be taken into account. The length of the manometer tube may play tricks on the readings. Hook a manometer on the blank end of the exhaust manifold, where it will read about as high as anywhere in the system. Vary the length of the rubber tube connection and watch the reading go up and down while the engine conditions remain constant! A maximum reading will be obtained when the distance from the manifold to the surface of the liquid in the manometer equals approximately 3400 divided by the number of explosions per second. Double this length and the reading will be a minimum. These two readings may show a discrepancy of thirty per cent. The amount of this discrepancy will vary with the position of the connection along the line. Furthermore, when the manometer is hooked on near a point of high acoustic pressure change, like the dead end of the manifold, try pinching the rubber tube at various distances along its length. We can easily demonstrate both increases and decreases in readings depending upon just how we pinch the tube. There is no steady gas flow in the manometer tube—just pulsations or standing waves of considerable intensity. Pinching the tube creates an acoustic rectifier. If the pulsations go toward the manometer more easily than the other way, the reading will be increased and vice versa. How much are these changes? Anywhere from fifty per cent less to over two hundred per cent greater and without really trying to make an efficient rectifier. The point of all this is that the very connection used to hook on the rubber tube may act as a rectifier and so give erroneous readings. In this case, the readings are generally too high. A pet cock makes a pretty good rectifier, especially when partially closed.

We have made back pressure readings by the notebookful. It is a complicated piece of business to test a model silencer on steady air and then try to predict what it will do on an engine, to say nothing of an engine of two thousand horsepower. The exhaust gas analysis, temperature throughout the exhaust system, quantity of exhaust gas, size of the exhaust piping and its length must be known if accurate calculations are to be made. Actually, we have considerable information taken in the field to help out, so that we generally know pretty well what the back pressure is going to be. We even think we can guess it within ten per cent. In the laboratory, with luck, we can predict it much more accurately. But to walk up to a silencer in any old exhaust system on any kind of engine running at a guessed at load and say what the back pressure is going to be does not come into the realm of precise determinations. An engine manifold is anything but a clean-cut acoustic system, what with valves popping open and shut up and down the line. The terrific temperature gradients both with respect to time and distance also add a few complications.

Now let's talk about silencers themselves and how they work. Conditions in the field vary so greatly, that not only a number of different sizes are called for but also, several different types. Special installation considerations also add to the list. One way of classifying silencers is to call them absorbers, filters, or preventors, or combinations of these three.

The absorber type makes use of fibrous material like rock wool, steel wool and other sound absorbing stuff. It works by dissipating the sound waves in minute channels and by losses incurred by inelastic bending. The material is disposed alongside the duct carrying the gases and sound. A perforated steel tube is generally surrounded with a thick layer, backed by an impervious containing shell. These silencers are effective on high frequency sounds travelling along in clean gas. They fill up with carbon deposits in a few days on a dirty exhaust. They also are prone to break up into dust under the stress of vibration.

The filter type operate on the principle of acoustic interference. Resonance chambers may be disposed along the main gas passage in a number of different ways, depending on just what the problem of silencing is. Acoustic filters may be designed to cover a very large range of sound frequencies. They are not particularly good on high frequencies, at least in commercial exhaust pipe sizes. Any desired degree of noise reduction can be obtained by their use without imposing any particular degree of back pressure, since the conduit is generally straight through, with no obstructions whatever. Another type of acoustic filter is the old familiar expansion tank. This gives wide fre-

Rugged terrain does not deter the oil man from exacting his full measure of oil from all available fields.

quency coverage, but not a great deal of attenuation unless the tank was made quite large. Two large tanks of different size can do a pretty good job of silencing.

The modern trend in silencer design is the preventer type. Perhaps we had better call this a "breaker-up-er". The gas surges coming from the engine or the surges in a compressor intake hit the silencer and are smoothed out so that they are incapable of creating sounds when they hit the open air. Furthermore, the sounds already present in the exhaust pipe are attenuated by the arrangement of chambers and tubes comprising the silencer. The acoustic system comprising the silencer itself is designed so that it cannot be shock excited into creating new sounds. Improperly designed silencers can operate as actual amplifiers for certain frequencies. A certain independence of pipe length is enjoyed by this type, but it by no means can be placed anywhere in a sensitive, tuned, engine exhaust system. It does render the tail pipe length less critical, in most cases. This general type performs so well on such a wide variety of jobs that we call it a "universal" type. It works equally well on compressor intakes, exhausts, engine intakes and exhausts. Its design is such that any number of units may be placed in series to give any possible required degree of noise reduction. Ordinarily two sections are used. For supersilencing, we use three. It has been found necessary to use four sections but once in our experience and in this case the exhaust had to be inaudible at a distance of five feet from the end of the exhaust pipe. To guard against shell noise, the entire silencer is made of laminated construction. Two contiguous metal surfaces not too closely joined act as a high acoustic resistance and prevent shell ringing. It's like holding a bell in the hands. It won't ring very well when struck. This type is also very effective in stopping tank hammer in air receivers.

Another special type combines the sound absorber type with the filter type and gives very high attenuation on certain intake systems such as positive pressure blowers. It has extremely low back pressure, but cannot be used on exhaust systems. It finds application on steam discharges and the like.

The universal type has been combined with other useful features in the internal combustion engine field. Its principles are used in spark arresting silencers of various types designed to meet the needs of the trade. Sometimes the cooling water is introduced into the silencer for spark arresting and extra silencing.

It finds application also in heat recovery silencers which save most of the heat otherwise thrown away. An extra degree of silencing results from the sudden chilling of the exhaust gases.

Two cylinder gas engines of the two cycle type are generally Y connected to a silencer. The theory of this type connection has been worked out and the results in the field have been gratifying. In fact more power can be obtained from a two cylinder, two cycle gas or gasoline engine when it is Y connected with the proper lengths of pipe than can be obtained with separate exhaust pipes for each cylinder. What is wanted is to slightly supercharge the cylinder with scavenging air that has been blown through the cylinder and then partially forced back by the wave action just as the port or valve closes. Oscillograms taken under conditions of maximum output verify this. What is not wanted in a tuned engine exhaust system is resonance. A single cylinder two cycle engine has great difficulty in even running at all with just the wrong length of pipe. It is very liable to four-cycle automatically, instead. The magic length is in the neighborhood of one sixteenth wave length. To reduce this to feet, first find the velocity of sound in the exhaust pipe by multiplying forty-nine by the square root of the absolute temperature of the exhaust pipe averaged over its length. This answer is in feet per second. Divide this velocity by sixteen times the revolutions per second and place the silencer with that length in feet between it and the port of the engine. A silencer placed at the correct distance from the port will not rob the engine of any appreciable amount of power. On the contrary, it is easy to demonstrate that a silencer placed in the line at what would be a wrong length without it, will actually increase the power output. And what is the back pressure under optimum running conditions for one of these sensitive engines? I don't imagine the engineer cares very much because he is getting maximum power, minimum temperatures and a sweet running job. Years ago we knew of an installation that was giving trouble because of high cylinder temperatures—yet the back pressure at the silencer was only a half inch of water! Had the back pressure been taken about ten feet nearer the engine, it probably would have been sky high!

On four cycle engines, the position of the silencer is not so important. Placing it an odd number of quarter waves from the center of the manifold and using a quarter wave long tail pipe seems to yield the lowest back pressure as well as the highest degree of noise reduction. Sometimes it is not possible to use a quarter wave long tail pipe, as in the case of high speed multicylinder engines of considerable size. A quarter wave tail pipe might turn out to be not much greater than the diameter of the pipe. In such cases the tail pipe must be longer. Some odd number of quarter waves will be best, but most any reasonable length will be o.k. We can't hit these spots as well in the field as in the laboratory, of course, but it is hoped all this information may be of some use to those who have an opportunity to use it. If the engineers making the plant layouts were cognizant of some of these facts, it is certainly possible that many installations would benefit thereby.

BUY

DEFENSE

BONDS

THIS LAUGH

OFF!!

A farmer was trying to sell a broken-winded horse to the Army, and was trotting him around for inspection. He stroked the animal's back and said to the buyer, "Hasn't he got a lovely coat?"

"Sure, his coat's all right, but I don't like his pants."

"I was rather disappointed in that gentleman you introduced to me last night."

"How so?"

"Why you spoke of him as a bridge expert, and he turned out to be nothing but a famous engineer."

"Yes, son, I'm a self-made man."

"Gee, dad, that's what I like about you. You take the blame for everything."

Customer: You don't seem quick at figures, my boy.

Newsie: I'm out of practice, sir. Most people say "Keep the change."

An officer giving a lecture in an army classroom suddenly turned upon a man aimlessly looking about the room.

Pointing an accusing finger, the officer barked: "What is the Dewey decimal system used for?"

The man looked wonderingly at him. "I dunno."

Exasperated, the officer demanded, "What's your organization, soldier?"

"Haven't got any, mister," the man replied. "I'm just the Coca Cola man here to refill the machine, wherever it is."

"Why is marriage like a cafeteria?"

"Because you grab what looks nice to you and pay for it later."

There's nothing strange in the fact that the modern girl is a live wire. She carries practically no insulation.

The story is going around about a maiden lady who when asked if one long stocking would hold all she wanted for Christmas, replied with a twinkle in her eye, "No, but a pair of socks would."

"Daddy," asked Bobby, "don't they ever give any showers for the groom?"

"No son," replied his dad, "there'll be plenty of storms for him after the bride begins to reign."

Yankee's letter from Italy read: "I'm enjoying beautiful Florence immensely."

His sweetheart replied: "If that's the way it is, you can stay in Europe. I am having a good time with Oscar!"

A good way to keep the youngsters out of the cooky jar is to lock it up in pantry and hide the key under the soap in the bathroom.

"That girl's as pretty as a picture."

"Nice frame, too."

The drunk was walking a wavering line down Main street, stopping every little while and trying to guess where he was. At last he turned to a passerby and asked, "Mister, where am I?"

"You're at the corner of Main and First streets."

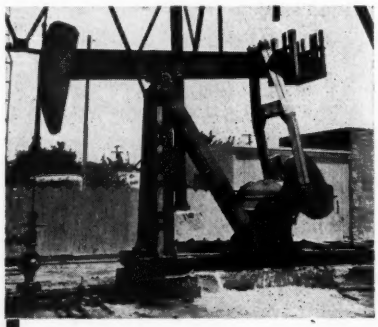
"Never mind the details," exclaimed the bewildered one, "what city?"

"What's the matter with your dog?"

"Ain't nuthin' wrong with him boss. He's jes' lazy."

"But there must be, or he wouldn't be yowling."

"It ain't nuthin' but laziness. He's settin' on a thistle."



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EXPORT OFFICE: 50 Church St., New York City

Federal Operations Committee Report on Foreign Oil Policy

Petroleum Administrator for War Harold L. Ickes made public recently a report made to him by the Foreign Operations Committee, making suggestions as to an American foreign oil policy.

Administrator Ickes made the report available without comment, stating that he had known that the Committee was making the study and that he had not had the opportunity to analyze it fully.

The report follows:

A FOREIGN OIL POLICY FOR THE UNITED STATES

Foreword

The Foreign Operations Committee, by virtue of the long experience of its members in foreign oil developments, its realization of the profoundly important role that oil is destined to play in postwar reconstruction, and its belief that worldwide oil developments by our own nationals will not only add to the security of the United States but foster the social and economic advancement of all peoples, herewith presents a program of principles and policies designed to advance the interests of the United States, to aid in the constructive development oi the oil resources of foreign countries by American nationals, and to release the creative potentialities inherent in petroleum that the world will so sorely need with the coming of peace.

I. Factors That Create An International Oil Problem

Various characteristics of petroleum create in the international sphere highly specialized problems calling for foresight, experience, skill, and statesmanship in their solution.

1. Oil is a unique commodity:

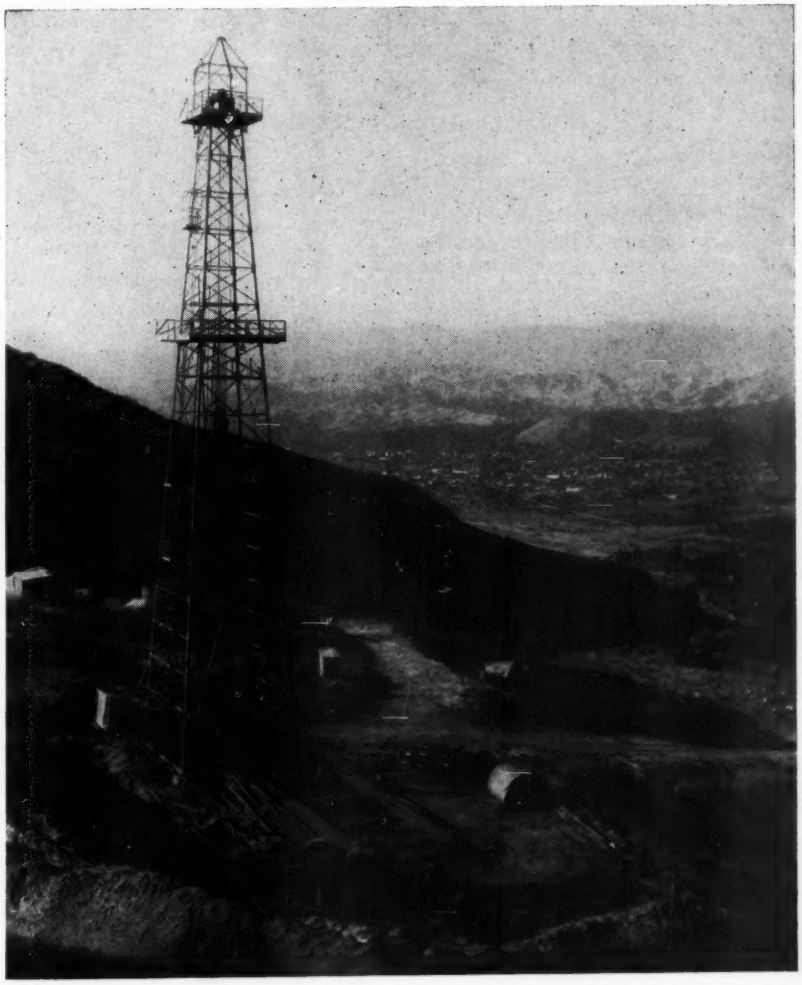
Its liquid nature, its chemical composition, its multiple uses, and its employment in great volume in the form of varied derivatives, give rise to a complex industrial structure appropriate to its special requirements.

2. Interest in oil is universal!

All countries are consumers of petroleum, most countries are importers, many countries are exporters. Oil is used in every part of the world and is essential to all industrial activities. It is also the chief support of the newer forms of transportation, as exemplified in the motor-car, the truck, the diesel boat, and the airplane.

3. The known oil resources of the world are limited and concentrated:

Five great regions contain an overwhelming proportion of the world's oil. These are: the United States, the Soviet Union, the Middle East, and the Far East, and the Caribbean area. The Middle East and the Caribbean area together probably



View from F. E. Fairfield's South Mountain No. 1, on sec. 19-3n-20w, looking northwest across the field flank towards Santa Paula, Ventura County. This well is a case example of wells drilled under difficulty. Lacking crews, Mr. Fairfield employed his Signal Hill supply co. staff men on week ends to rig the project up. Deepened on contract by Shelly well pullers—the well is rigging pump thru the good offices of the same Signal Hill supply men which included clerks, mechanics, salesmen and carpenters. Active on the unusual job were F. E. Fairfield, Oscar E. Shehorn, Milo P. Webb, Geo. Milligan, Geo. Poe, Bob Dinard, Buck Pridy and Ray Asburn. Deepened from 2750', where small production was obtained, to 4991 ft. in oil sand the well is open with perforations from 2850 ft. to bottom. Oil is standing at the top of the hole and has shown disposition to flow.

contain more known oil than the rest of the world.

4. Oil exploration and discovery present extraordinary difficulties, requiring more rare and specialized abilities:

Undiscovered oil is a present asset to no one; if it is to serve an economic purpose, its discovery must be facilitated. Most of the oil so far discovered in the world has been found either by American enterprise or by techniques developed in the United States.

5. Oil is charged with a high economic potential:

Modern industry and agriculture depend upon oil, and social advancement may be measured in terms of its per capita use. Oil development can be used as a catalytic agent for economic and social improvement in all countries.

6. Oil development can best be handled by private enterprise:

(a) Private operations reduce the political dangers inherent in the international field.

(b) Private enterprise is the best source of the venture capital required for the undertaking.

(c) Private enterprise can best supply and develop the requisite managerial and engineering techniques.

(d) Oil operations involve exploration, production, transportation, refining, and distribution. Governments entering the oil business in one area will soon find themselves extended directly and indirectly into a far-flung complex of international complications transcending the original locus.

II. Special Interest of the United States in Oil

1. The concern of the United States with world affairs is inescapable:

As a result of world developments, the United States has an inherent interest in the assurance of peace and economic stability in the postwar world.

2. Oil developments aboard are of critical importance in the foreign policy of the United States.

The United States is concerned with the promotion of measures for facilitating and smoothing the necessary expansion of the world's petroleum industry, without which world peace and econmic stability will be more difficult of attainment.

3. The economy of the United States probably faces partial dependence upon foreign oil resources:

Long an oil exporter on balance, the United States may face a significant change in its status. Evidence points to the imminence of a shift from a condition in which this country has surplus oil for export to one in which the nation will become a net importer of oil. This expected change will make the economy of the United States partly dependent upon foreign oil resources.

4. The national security of the United States is dependent upon adequate world oil developments:

The security of United States military power is enhanced by having adequate and strategically located sources of oil supplied throughout the world in the hands of American nationals.

5. The Government of the United States can benefit all peoples by encouraging the energy of private enterprise in world oil developments:

In addition to more direct imperatives, the United States faces an opportunity of going beyond the obvious necessity of protecting its own interests—an opportunity having to do with the positive objective of accelerating world reconstruction and raising the living standards of all countries.

6. The proficiency of the petroleum industry of the United States is an invaluable agent for promoting postwar reconstruction and industrial advancement throughout the world:

The United States possesses, in the skill of its own nationals in oil development, an asset of inestimable value not only to this country but to all other countries. This asset may be galvanized into a powerful force for world reconstruction if implemented by a national policy designed to this end.

III A Constructive Approach

The international oil problem is of such major dimensions that the Government of the United States should not only take action with respect to promoting the interests of its own nationals, but should also assume leaderhip in assuring the collaboration of other nations and the coordination of oil policies among nations.

1. The prosperity and security of all peoples require the efficient and orderly development of the world's oil resources:

(a) Efficient and orderly development involves the application of advanced engineering practices, and especially the implementation of the concept of the optimum rate of production.*

(b) The universal application of the optimum-rate principle will result in the development of surplus producing capacity available in case of emergency. Its advantages have been fully demonstrated in the United States where it is proving invaluable during the war. It is a fortunate, although fortuitous, circumstance that the principle is equally advantageous in peace and war.

(c) Efficient and orderly development requires that the producing capacities of the various sources of supply be balanced with the needs for oil.

(d) Efficient and orderly development requires a clear definition of the respective roles of private enterprise and governments; dependability of contracts; non-interference with operating procedures once proper rules are set; and equal opportunity among competitors.

(e) Efficient and orderly development is possible only if contracts are respected by the parties to them, and if means are available for prompt and equitable solution of disputes arising under them.

2. The national oil policy of the United States should aim at securing for American nationals access to the world's oil resources on equal terms with the nationals of all other countries:

*The "optimum rate of production" is derived from the fact that "an oil well can not be operated at full capacity without suffering a premature decline in its rate of output and an ultimate loss underground of a material proportion of the oil that otherwise would be recovered."

(a) National policies favoring state monopolies and discriminating between nationals of different countries are harmful not only to our nationals but to the nationals of all countries.

(b) Duties and taxes which tend to restrict consumption are harmful to all legitimate interests alike.

(c) While fair participation by foreign countries through royalties or taxes is desirable, it is to the interest of all countries to preserve incentives adequate to attract capital and insure continuity of expansion.

(d) In conducting business in foreign countries, many of which have economic concepts differing from ours, United States interests must conform to the laws and customs of the countries in which they operate if they are to do business on an equal footing there with foreign competitors. Until United States laws consistent with the welfare of our own country clearly authorize American interests to compete abroad on an equal basis with foreign industry, American business in other countries will be handicapped and American foreign trade consequently suffer.

(e) Even with equal access to oil resources assured to United States nationals, it will be illusory unless the government undertakes to see that acquired rights are respected.

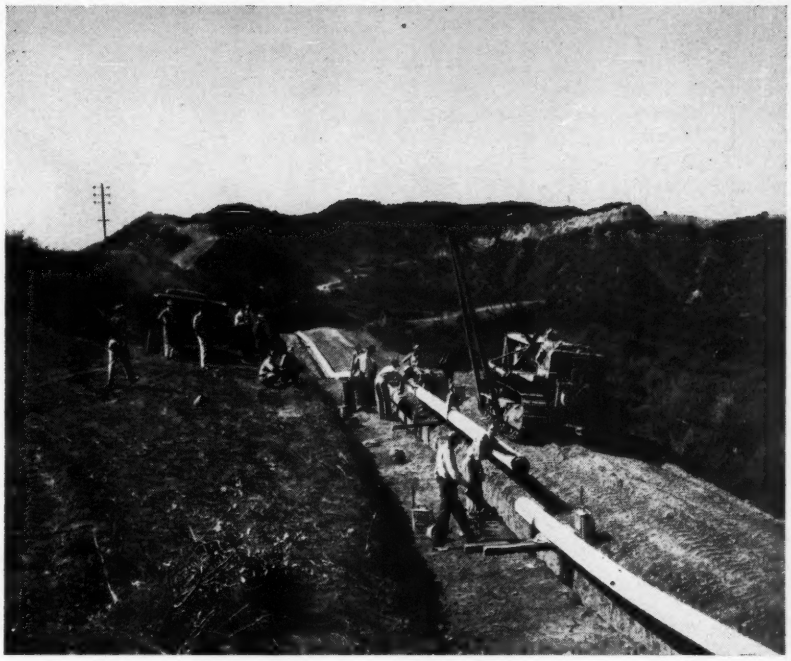
3. Oil in the hands of nationals of the United States is equally available for national security with oil owned or financially shared in by the Government of the United States:

(a) Refineries constructed by private initiative for commercial purposes are likewise available during war for the needs of our country.

4. The Government of the United States should encourage private American enterprise to engage in the development of oil resources abroad:

(a) Private American enterprise has already demonstrated its ability in international oil developments.

(b) To enhance national security many and widely distributed sources of products for military supply should be in the hands of United States nationals. Such sources have been developed by private industry and in many areas can only be so developed. Only through distributing facilities as well as sources of supply can these requirements be assured.



Moving the oil from source to end point is still an important part of the total job our industry must accomplish despite obstacles.

(c) Many countries not only resent but prohibit by law the holding of national resources by an alien government either directly or indirectly, while permitting private capital to operate freely. Government enterprise may thus prove a handicap in time of war, as recent experience has demonstrated.

(d) Any direct participation by the Government of the United States in foreign oil operations, whether alone or in partnership with private corporations, will discourage private enterprise; and will not only increase the political complications but will retard the orderly development of the world's oil resources.

(e) The scope of foreign oil developments has been restricted by the large number of risks involved. Some of these risks are common to oil exploration and development in general, but in addition there are special risks arising from conflicting national policies endangering the continuity of operations. Within the United States the latter category of risks is absent and in consequence oil discovery has been immeasurably enhanced by the multiple efforts of great numbers of operating units. Similarly, these benefits can be gained for foreign operations by measures making for increased stability. The Government of the United States can serve the interests of a greater number of its own nationals and at the same time promote the interests of foreign countries by means of a foreign oil policy designed to reduce the political risks inherent in foreign oil operations.

(f) In the period of transition from war to peace, questions will arise as to the disposition of oil facilities abroad which the Government of the United States has acquired in the course of the war. In general such facilities should be disposed of to private enterprise.

(g) During the war the Allied Nations have built a great many facilities for handling oil products in the way of bulk storage, sea-port installations and air-ports—particularly in the Eastern Hemisphere. When these facilities are no longer needed for war they should be disposed of in such a way as to insure of fair and equitable participation therein by

American companies in the world's oil trade.

5. To avoid international friction and the growth of dangerous rivalries the national policy of United States and the national policies of other countries should be coordinated:

(a) To the extent that the policies of different nations can be reconciled in terms which best serve the interest of world peace and economic advancement, the interests of all countries and all peoples will be promoted.

(b) Coordination of national policies will be essential in any efforts to check the accumulation of excessive stocks of oil by countries bent on aggression.

6. Such coordination requires the establishment and maintenance of machinery for continuous consultation:

(a) The coordination of national policies may best be achieved by means of free and open discussion and voluntary agreements between governments.

(b) The establishment of special machinery for this purpose will greatly facilitate such coordination.

(c) The democratic process in this field, as in others, is superior to coercive methods.

IV. Immediate problems of Pressing Urgency.

The needs of the United States in respect to the development of the world's oil resources combine both immediate and long-range problems. These problems are interrelated, for steps taken in the direction of resolving problems of present urgency may set the pattern for the continuing oil policy of this country. Measures initiated under the stresses of war conditions and during the period immediately following the end of hostilities, should be consistent with the longer-run interests of this country.

A sound foreign oil policy for the United States will envisage not only the adoption of well conceived principles but also their ultimate implementation through machinery of international understanding. Time will be required for the establishment of an agency of international coordination and consultation, and and in the interin the Government of the United States will have to act on oil matters and make decisions of grave import.

1. Changed conditions require changed policies:
The war has brought about radical changes in the status of the United States in respect to the oil resources of the world.

(a) The United States is faced with the prospect of shifting from the status of a net exporter to that of a net importer of oil, thus bringing into view the possibility of partial dependence upon foreign sources of supply.

(b) The advances in military techniques, especially in naval operations and aviation, have emphasized the need for far wider availability of oil facilities and supplies throughout the world than heretofore.

(c) In the face of enlarging requirements, there has been an accelerating growth of restrictive measures narrowing the opportunities for the development of the world's oil resources.

2. A foreign oil policy must be established at once if the interests of the United States are not to be sacrificed:

(a) The combined domestic and foreign oil reserves held by nationals of the United States constitute a smaller proportion of the petroleum reserves of the world than the ratio of United States consumption of petroleum to total world consumption. Action is needed to enlarge the reserves under the stewardship of nationals of the United States, and to encourage the retention of existing contracts.

(b) Nationals of the United States should not be in a position of inferiority in acquiring and developing petroleum reserves within the territories or spheres of influence of other nations.

3. Private enterprise is the best medium for oil development:
Of the three possible methods for developing the oil resources of the world—government operations, private enterprise, and mixed operations—private enterprise is the surest and soundest choice.

(a) Private enterprise has developed the requisite managerial skill and operating knowledge, and is already well-established.

(b) Private enterprise can operate with a minimum of political complications, as most foreign countries readily admit foreign capital but few countries, if any, would look with favor upon operations by alien governments.

(c) Operations of United States oil companies are at present wellnigh worldwide in scope. This is a major factor in effective national defense and will be a major factor in facilitating peaceful commerce.

(d) The greatest immediate need on the part of private enterprise is the assurance of our Government that it will seek to reduce the political risks involved in the use of private capital abroad, and that it will take no steps to discourage the efforts of the nationals of the United States to maintain an effective and serviceable oil industry in foreign countries.

4. Bare essentials of an immediate foreign oil policy:
The principles regarded as essential to the welfare of the United States in respect to oil are given in detail in the preceding pages of this document. The principles of more immediate urgency may be summarized as follows:

(a) The American petroleum industry should be encouraged to expand its plans for developing the world's oil resources. This encouragement requires assurance that nationals of the United States will receive the cooperation of our Government in securing a position of equal opportunitiy with the nationals of other countries and that the Government itself will not enter into competition with its own nationals.

(b) Existing handicaps in the oil operations of our nationals abroad should be examined in the light of their incidence upon our national welfare, and efforts should be made to remove such handicaps as originate in the laws and practices of the United States. American nationals operating abroad must be able to comply with the laws and customs of foreign countries without

incurring the risk of violating American laws.

(c) The diplomatic support accorded to our nationals by the Government of the United States should be as effective as that accorded to nationals of other countries by their respective Governments.

(d) The ultimate disposition of oil facilities and supplies developed or paid for abroad by the Government of the United States in the course of the war should be so designed as to promote the interests of our nationals in the postwar world.

(e) Our foreign oil policy should also include appropriate measures for the return after hostilities of American owned properties, rights and interests in Axis-held territory; adequate compensation for assets destroyed and damaged; and assurance of an early commercial operation of returned properties.

5. Suggestion for medium of government-industry consultation:

(a) The American petroleum industry should be admitted more fully into the policy councils of the Government of the United States, and its ideas and experience should be availed of in a consultative capacity in all policies and measures affecting the future status of foreign oil operations.

(b) It is suggested that the Government of the United States should appoint a committee from the United States oil industry with suitable experience in foreign operations to maintain a continuing consultative connection with the Oil-Policy-Making departments of our Government.

V. Special Cooperation With Great Britian

A large part of the known oil reserves involved in international trade trade are owned, controlled, or under concessions held by nationals of the United States and Great Britain. It is desirable, therefore, that the two Governments take the lead in achieving an agreement on basic principles consistent with what is outlined above, to guide their activities and the activities of their respective nationals during and after the war.

VI. A Suggested Form of International Orangization

In the Interstate Oil Compact oi 1935, the United States has created a valuable precedent for the lines to be followed in international coordination:

(a) Our own Interstate Oil Compact does not oust our States from control of their own policies. Similarly each country must be left freedom with reference to its own policy.

(b) Within the United States, the Interstate Oil Compact assures the coordination of policies of the various States, with Federal encouragement. Similarly, the oil policies of various countries need to be coordinated.

An International Oil Compact is suggested as the best means of assuring international cooperation in the future. A design for such a compact is attached hereto.

Foreign Operations Committee

NOTE: As Mr. H. F. Sinclair is out of the country and his alternate has been unable to communicate with him on the subject matter, he took no position on this outlined policy or report.

DESIGN FOR AN INTERNATIONAL OIL COMPACT

1. AN INTERNATIONAL OIL COMPACT should be negotiated with the following general objectives:

(a) Efficient and orderly development of the world's oil resources.

(b) Prudent conservation of the world's oil resources.

(c) Equitable distribution of oil to the peoples of all nations.

(d) Avoidance of national restrictions imposed as artificial aids to the production of synthetic or substitute products.

2. THE INTERNATIONAL OIL COMPACT should be open to adherence by all countries, producing and consuming countries alike. It should become operative upon the adherence of five countries, provided that the five countries include the United States of America.

3. THE INTERNATIONAL OIL COMPACT should provide for:

(a) A General Conference of representatives of the adhering countries, meeting at least as often as biennally. Each representative may be accompanied by advisers, chosen with a view to the participation of different groups interested in the oil industry.

(b) A Permanent Commission composed of representatives of the adhering countries of chief importance as consumers of Petroleum and of representatives of the chief industrial oil organizations in the leading oil producing countries, meeting at least semi-annually. Each representative may be accompanied by advisers.

(c) A Technical Institute, placed under the supervision and control of the Permanent Commission, to pursue the investigations necessary for the work of the General Conference and of the Permanent Commission, and to serve as a center for gathering and disseminating information and for advancing technical methods and standards.

(d) Regional Councils to be created by the Permanent Commission to promote the special coordination which may be needed in particular regions. Each council should consist of representatives of the local Governments of the oil-producing countries of the region, and of representatives of the principal oil operators or groups of operators locally engaged with a chairman nominated by the Permanent Commission.

4. THE INTERNATIONAL OIL COMPACT should provide that the General Confervence and the Permanent Commission shall endeavor to encourage the accordination of national policies in pursuit of the general objectives of the Compact, and that to this end either body may recommend measures needed for effective coordination.

The General Conference should have power to promulgatedraft international conventions on matters relating to the oil industry, such conventions to become operative for the countries which ratify them.

(Continued on Page 32)

Field Development

Los Angeles Basin

Outposts Drilling

Two westerly outpost wells to the Aliso Canyon field are drilling ahead. In section 29-3n-16w, Standard Oil Co. Frew No. 1-2, is spot coring in shale with streaks of lower Sesnon zone oil sand at 8630 ft. From the results of a formation test run on the upper portion of the Sesnon zone, the Standard seems assured of a discovery in this well. About 2000 ft. northwest from this well the Barnsdall-Bandini combination test, Roosa No. 1, is drilling ahead below 2000 ft. The operator reports drilling through several streaks of basalt in the upper portion of the hole, with the bit now in sand and shale of the Topanga formation. Southeast of these wells in section 28-3n-16w, the two outpost wells of the Tide Water Associated Oil Co. are drilling ahead. Porter No. 46 is drilling in sand and shale below 6800 ft. while Standard-Sesnon No. 1-3 is at 3400 ft. Both of the above wells are outposts on the southwest flank of the field.

El Segundo "Cat" Heading West

In the northwest edge of the town of El Segundo, the Pauley brothers Loftus No. 1, is drilling ahead in shale below 3700 ft. Located in section 11-3s-15w, the operators have already run several whipstocks to direct the hole to the west under the Los Angeles County sewer farm. The well will be taken to the Schist contact if shallower commercial production is not obtained. Approximately one mile east of this well, in section 12-3s-15w, the Apex Petroleum Corp. has staked location for Elsie Comm. No. 6. The hole will be located on the northeast corner of Grand and Sierra streets, in the northwest end of the El Segundo field.

Del Valle Outpost Running Liner

Standard Oil Co. Newhall Land and Farming Co. No. 3-1, is reaming preparatory to running a 5½-inch blank liner. Located in section 19-4n-17w, southwest of the Del Valle field, hole was drilled and cored to a total depth of 7636 ft. A string of seven inch casing was cemented at 6055 ft. after a formation test of the zone from 6021 ft. to 6079 ft. recovered 2300 ft. of oil. The 5½-inch liner will be cemented on bottom and gun perforated in stages.

Shallow Test For Newhall Area

The Petroleum Exploration Co. is making preparations to drill a shallow test on section 31-4n-15w in the Newhall area. The well will be known as Kraft No. 1, and is located 878 ft. north and 1750 ft. west from the southeast corner of the section. Operations are to start in the near future.

Union To Drill At Whittier

The Union Oil is pouring a blitz rig foundation for Sansinena No. 14. Located in section 32-2s-10w, the well will test the shallow sands being produced in wells to the west. Approximately two miles east of this location, the C.C.M.O. Co. East Whittier Comm. No. 1-1, located in section 34-2s-11w, is spot coring ahead in hard Pliocene shale below 5400 ft.

LOS ANGELES BASIN WILDCATS

Area	Well	No.	Section	Depth	Status
Athens	J. Paul Getty, Westmore	1	2, 3-14		Location
Aliso Canyon	Barnsdall-Bandini Pet. Co., Roosa	1	29, 3-16	1846	Drilling
	Standard Oil Co., Frew	1-2	29, 3-16	8629	Drilling
	Standard Oil Co., Del-Aliso	1	29, 3-16		Grade
Del Valle	Standard Oil Co., N.L. & F.	3-1	19, 4-17	7636	Rng. liner
Dominguez	Cont. Expl. Co., Del-Amo	1	8, 4-13		Location
Downey	T.W.A.O. Co., Downey	10-1	4, 3-12		Grading
El Segundo	E. W. & H. R. Pauley, Loftus	1	11, 3-15	3704	Drilling
Newhall	Pet. Expl. Co., Kraft	1	31, 4-15		Location
Puente	Horace Steele, Opr., Kenwood	1	17, 2-10	4275	Idle
	J. C. Drilling Co., Kelso	1	12, 2-10	3442	Idle
Sylmar	Richfield Oil Corp., T.I.T.	1	19, 3-15	6382	Drilling
Towsley Canyon	Haws & Ellsworth, H. E.	1	8, 3-16		Location
Whittier	C.C.M.O. Co.,E.Whittier Comm.	1-1	34, 2-11	5316	Drilling
	Union Oil Co., Sansinena	14	32, 2-10		Foundation
	Orange County				
Buena Park	Gen. Pet. Corp., Heath	1	34, 3-11		Rigging up
East Coyote	Barnsdall O.Co.,Sunny Hills Ranch	1	22, 3-10	4727	Drilling
	San Bernardino County				
Chino Hills	Wm. Y. Lee, Corehole	2	21, 2-8	1800	Drilling
Soquel Canyon	A. F. McCain, Soquel	1	6, 3-8		Rig

Brea Outpost To Deepen

Orange No. 24, the Shell Oil Co.'s northwesterly outpost well to the Brea-Olinda field, is being conditioned to deepen from a present depth of 1850 ft. Some shallow showings were found between the depths of 1640 ft. and 1700 ft. The hole was plugged to 1705 ft. and a string of 13⅜-inch casing cemented at 1640 ft. A perforated oil string was landed at 1705 ft. and well placed on pump. After pumping out the circulating oil the well flowed heavy oil by heads at a two barrel per day rate. The gas production was gauged at 175 mcf per day. The hole is located in section 2-3s-10w, about 900 ft. west of the nearest producing well. In the center of the field, on section 7-3s-9w, the Union Oil Co. has completed Naranjal No. 16, for an initial production of 274 barrels per day of 17° gravity oil. The hole was bottomed in gray sand at 4495 ft. and plugged back to 3240 ft. Production is coming from 508 ft. of perforations between the depths of 2727 ft. and 3240 ft.

Standard Completes Emery Zone Well

In the West Coyote field the Standard Oil Co. completed Murphy Coyote No. 133 for an initial production of 674 barrels per day. Located in section 20-3s-10w, the hole was drilled and cored to a total depth of 5900 ft. and has seven inch casing cemented over the Emery zone at 5495 ft. The operator is preparing to spud Murphy Coyote No. 134 on section 18, and location is being grade for Murphy Coyote No. 135 which will be drilled as a shallow gas test.

New Sand At Oak Canyon

Western Gulf Oil Co. L. W. Gilmour Fee No. 1, has apparently discovered a new producing horizon on the east flank of the field. Located in section 32-5n-17w, the hole was drilled and cored to a total depth of 7495 ft. and cemented 5½-inch casing at 7431 ft. after finding the top of the Lechler zone at 7125 ft. The new zone, which was first noted on logs of nearby wells, looked so good that the operator decided to try it out before testing the Lechler zone. The 5½-inch casing was gun perforated between the depths of 5355 ft. and 5420 ft. On the pump well gauged an initial production of 200 barrels per day of 24° gravity oil cutting 2.0%. The completion of this well opens for development a new zone on the east flank of the field. This new zone has been named the Gilmour sand.

Barnsdall Drilling East Coyote Test

On the Sunny Hills Ranch, west of the known producing limits of the East Coyote field, the Barnsdall Oil Co. is drilling ahead in Sunny Hills Ranch No. 1. Located in section 22-3s-10w, the hole is now being drilled in shale and gray sand below 4700 ft. A number of spot cores have been taken but the operator has not divulged any information as to how the well is correlating with surrounding wells.

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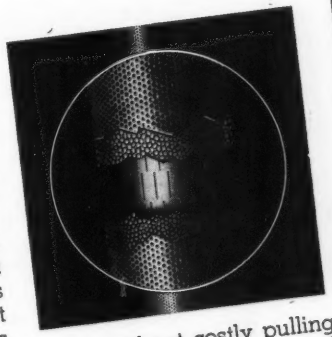

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New Test For Chico Area

Approximately 1½ miles northwest of its discovery well, Chico No. 1, the Richfield Oil Corp., has staked location for Comm. Two No. 1, in section 6-21n-1e. Operations are to start at once. About seven miles west of this well, in section 12-21n-2w, the Superior Oil Co. has spudded in on Capay Grant Comm. No. 1 and is now drilling ahead below 1300 ft.

Solano County "Cat" Testing

In the Suisun Bay area, the Standard Oil Co. is reaming preparatory to making an open hole test in A. O. Stewart No. 1. Located in section 25-3n-1w, hole is now bottomed at 8555 ft. The showings are reported to be in very hard tight gray sand. In this same section the operator's Honker Comm. No. 1-A, is being redrilled below 6300 ft. to sidetrack drill pipe which was twisted off and left on bottom at 8304 ft.

Santa Maria "Cat" in Shale

East of the easterly producing limits of the Santa Maria Valley field, the Continental Oil Co. Davis No. 1, is spot coring ahead in hard gray shale below 1800 ft. The well was held up at 1600 ft. by a twist off which was finally recovered. The try is located in section 28-10n-33w.

Camarillo Test In Volcanics

The Camarillo Oil Co. Camarillo No. 1, is coring ahead in Andesite breccia at 2480 ft. Located in section 32-2n-10w east of the town of Camarillo, the well hit the first volcanics at 470 ft. The hole was drilled and cored to 1836 ft., plugged back to 1130 ft. and 8⅝-inch casing cemented at 706 ft. A bailing test of this interval recovered fresh water with a few spots of heavy oil. The hole was then cleaned out to bottom and a string of 6⅝-inch casing was cemented at 1627 ft. A bailing test made of the zone from 1627 ft. to 1836 ft. showed only a very small amount of water. Northeast from this well in section 28-2n-20w, Jos. Schuck, Schuck No. 1, is drilling ahead in gray silty sand below 400 ft.

Fillmore "Cat" Sidetracking

Northwest of the town of Fillmore, the Standard Oil Co. Fillmore Comm. No. 2-1, is redrilling to sidetrack a drill pipe fish. The drill pipe was twisted off and left in the hole from 10,785 ft. to 10,855 ft. New hole was drilled along side of the twist off to 11,091 ft. and the fish cemented in place. They are now redrilling and making new hole at 11,010 ft. The hole is located in section 24-4n-20w.

New Test For Holser Canyon

The Standard Oil Co. is grading roads and location for a southerly outpost well to the Holser Canyon field near Piru. The well will be known as Bowman No. 1, and will be located 330 ft. north and 330 ft. west from the south ¼ corner of of section 14-4n-18w. The well is being drilled to test Miocene sands south of the Holser Canyon fault.

Outpost Spudded

Los Nietos Co. Elkins No. 2-1, spudded in on January 11th, and is now preparing to drill ahead after cementing 11¾-inch surface casing at 325 ft. The hole is located in section 5-3n-19w, west of the known producing limits of the Shiells Canyon field. Well is being drilled under contract, by the recently formed firm of McCarthy and O'Brien.

Rincon Activity

The old Rincon field is once more becoming quite active. The C.C.M. O. Co. is keeping one string of tools running continuously and is preparing to place Hobson No. B-1 on production. The hole was redrilled from 765 ft. and bottomed in the Miley zone at 4442 ft. A string of seven-inch casing was cemented on bottom and gun perforated from 4125 ft. to 4440 ft. The General Petroleum Corp. Ferguson No. 6,

COASTAL COUNTIES WILDCATS

Area	Well	No.	Section	Depth	Status
S. M. Valley	Continental Oil Co., Davis	1	28, 10-33	1784	Drilling
	Ventura County				
Camarillo	Camarillo Oil Co., Camarillo	2	32, 2-20	2479	Drilling
	Jos. Schuck, Schuck	1	28, 2-20	396	Drilling
Fillmore	Standard O. Co., Fillmore Comm.	2-1	24, 4-20	11091	Redrilling
Happy Camp	Cal Camp Oil Corp., Harrington	1	21, 3-19		Location
Oxnard	Edward F. Delaney, Todd	1	6, 1-21	3789	Prep. to pump
	Exeter Oil Co., Ltd., Lennox	2	6, 1-21	2572	Stdg. cem.
	Hub City Pet. Co., Chase	1	6, 1-21	1955	Idle
Piru	Pac. West. Oil Corp., Temescal	16	4, 4-18		Rig
	Standard Oil Co., Bowman	1	14, 4-18		Grade
Santa Paula	J. J. Stevens, Corehole	1	31, 4-20	2483	Idle
Sespe	Merchants Pet. Co., Cochrane	7	1, 4-20	1750	Rng. casing
	Volunteer Pet. Co., Tar Creek	3	28, 5-19	1747	Drilling
Shiells Canyon	Los Nietos Co., Elkins	2-1	5, 3-19	325	Drilling
Simi	Mayo Oil Co., Montgomery	1	16, 2-18	1920	Drilling
South Mt.	Cambria Oil Co., Well	1	13, 3-21		Location
	F. E. Fairfield, S. M.	1	19, 3-20	4991	Rigging pump
Timber Canyon	Geo. H. Roberts, O'Leary	1	29, 4-20	18	Idle

NORTHERN COUNTIES WILDCATS

County	Well	No.	Section	Depth	Status
Glenn	Gen. Pet. & Union Oil Co., Orland Comm.	8-1	11, 21n-3w	3209	Drilling
	Richfield Oil Corp., Afton Comm.	1	2, 18n-1w	3715	Drilling
	Superior Oil Co., Capay	1	12, 21n-2w	1330	Drilling
Humboldt	Br.Am.O. Prod. Co., Mitchell-Dorr	1	10, 3n-1w		Location
San Joaquin	Richfield Oil Corp., East Stockton	1	5, 1n-8e	6585	Drilling
	Standard Oil Co., Fairoaks Comm.	1	19, 1n-7e		Idle
Solano	Standard Oil Co., Honker Comm.	1A	25, 3n-1w	8304	Redrilling
	Standard Oil Co., A. O. Stewart	1	25, 3n-1w	8555	Drilling
	Standard Oil Co., Suisun Comm.	3	5, 3n-1w		Bldg. racks

is coring ahead below 2800 ft. in oil sand with streaks of shale, after cementing 8⅝-inch casing over the Miley zone at 2745 ft. Honolulu Oil Corp. Whitten Permit No. 56-7, lost the hole twice at 750 ft. and is now cleaning out in an attempt to get back into the old hole. The present depth of the old hole is 3091 ft. The Richfield Oil Corp. is preparing to spud in Hobson State No. F-7. The well will be spudded in at 750 ft. using the surface casing in the old abandoned Hobson Fee No. 4.

Ventura Avenue Pushing Southwest

The Shell Oil Co. is again pushing the producing limits of the Ventura Avenue field to the southwest. Locations have been reported for two outpost wells. Taylor No. 172-C-3-J is a rig, located 1900 ft. south and 11,620 ft. west from Rancho corner No. 11 while location is being graded for Taylor No. 175, 2470 ft. south and 11,840 ft. west from the same corner. In this same area the operator's Taylor No. 166 was recently completed for an initial production of 1184 barrels per day of 30° gravity oil and 2,260 mcf per day of wet gas. The well is producing from two perforated intervals between the depths of 6865 ft. and 7940 ft.

Deep Test To Go on Pump

In the Long Beach Beach field, the Texas Co.'s De Soto zone test, Fields No. D-1, is being rigged to pump. A prolonged swabbing test, showed the hard tight sands of the De Soto zone to be giving up only five to ten barrels per day of gross fluid. The 5½-inch casing has now been perforated in the old deep zone between the depths of 7810 ft. and 7930 ft., from which interval the current pumping test will be made. Total depth of the hole is 10,324 ft. with 5½-inch casing shut off at 9239 ft. The hole is located northwest of the intersection of Spring and California Streets.

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San Joaquin Valley

Greeley Well Completed

The Superior Oil Co. Lewis No. 4, was completed on January Sixth flowing an initial production of 2016 barrels per day of 38° gravity oil showing a cut of 0.3% with a 48/64-inch bean and 585 pounds flow pressure while gas production was gauged at 850,000 cu. ft. Located on the west flank of the field, near the north ¼ corner of the northwest ¼ of section 12-29s-25e, the hole was drilled to a total depth of 11,500 ft. A full string of 7⅝-inch casing was cemented on bottom and gun perforated in two stages between the depths of 11,451 ft. and 11,495 ft. The completion of this well again demonstrates what can be done in an old field by selective perforating.

North Belridge Activity

Development of the deep zones found in this field is continuing at a steady pace. The Belridge Oil Co. is currently making an open-hole production test of the "R" zone in well No. 37-1. The well flowed at a rate of 445 barrels per day of 30° gravity oil showing a cut of 30%, through a 96/64-inch bean with 300 pounds tubing pressure and 1025 pounds casing pressure. Gas production was 1,650,000 cu. ft. per day. The total depth of the hole is 8494 ft. In section 27-27s-20e the Belridge Oil Co. has derrick erected for well No. 29-Y-27. Tide Water Associated Oil Co. well No. 34-21, is currently drilling ahead in shale below 5800 ft. and Richfield Oil Corp.'s recently completed Belridge No. 4 has been beaned back and is flowing 117 barrels per day of clean oil, from the "R" zone.

Outpost Well Coring Shale

The Texas Co. S.P. No. 58-21, is coring ahead in shale with streaks of gray sand below 9350 ft. The try is located on section 21-19s-16e, approximately two miles east of the easterly producing limits of the Northeast Coalinga Eocene field. The operator has released no information as to the section taken. However the hole is unofficially reported to be well into the Cretaceous formation.

Kettleman "Cat" Running Casing

Two miles north of the North dome of Kettleman Hills, the Standard Oil Co. is running seven-inch casing in Bourdieu No. 1-A. Located in the Polvadero area on section 1-21s-16e, the hole has been bottomed at 10,348 ft. after sidetracking a drill pipe fish from 10,249 ft. to 10,299 ft. The well will test some fair showings in the Eocene sand, the top of which was found at 10,264 ft.

Shell To Try Dyer Creek Again

Southeast of the small producing area of Dyer Creek, the Shell Oil Co. is grading location for Cairns No. 1. The location reported is 1274 ft. south and 307 ft. west from the northeast corner of section 14-26s-27e. The test will be drilled into the Vedder sand.

Stockdale Area To Get Test

West of the Stockdale Country Club, the Western Gulf Oil Co. is grading roads and location for KCL No. 77-5. The location for this

SAN JOAQUIN VALLEY WILDCATS

Area	Well	No.	Section	Depth	Status
	Fresno County				
Coalinga	The Texas Co., S. P.	58-21	21, 19-16	9355	Drilling
Jacalitos	Standard Oil Co., Well	67-17E	17, 21-15	5115	Drilling
	Standard Oil Co., Wells Fargo	1	30, 21-15		Location
Lanare	Amerada Pet. Corp., Cal.-Lds.	65-15	15, 17-18	8200	Sampling
Nicholson	Shell Oil Co., Inc., S. P.	73-35	35, 15-15	8100	Drilling
Polvadero	Standard Oil Co., Bourdieu	1A	1, 21-16	10348	Rng. casing
Raisin City	Pauley, E. W. & H. R., Well	21-29	29, 15-18	5698	Testing
	Shell Oil Co., Inc., San Joaquin	2-1	9, 15-17	6255	Drilling
Riverdale	Amerada Pet. Corp., Furtado	55-36	36, 17-19	7970	Drilling
	Kern County				
Antelope	Etienne Lang, Occidental	3-NW-30	30, 26-19	1496	Idle
Ant Hill	Amerada Pet. Corp., S. P.	2-15	15, 29-29	4385	Drilling
Belridge—South	C.C.M.O. Co., Temblor	36-1	36, 28-20		Foundation
Bowerbank	The Texas Co., Bowerbank Unit II	8B	8, 29-24	261	Drilling
Comanche Point	T. W. Burnham, Chiquita	2	34, 12-19	2250	Idle
Devils Den	Priest & DeKalb Blake	1	25, 25-18	585	Drilling
Dyer Creek	Shell Oil Co., Cairns	1	14, 26-27		Grade
Elk Hills	Capital Co., Tupman	1	24, 30-24		Location
	Pacific Western and G. F. Getty, Transport	64	26, 30-24	10555	Idle
Edison	Tracy Harkness Seale	2	5, 30-29	4217	Drilling
	J. Paul Getty, Hoagland	1	8, 30-29	150	Drilling
Edison, SE	Judy K Oil Co., El Tejon	1	22, 30-30		Rigging up
Gould Hills	Union Oil Co., Richardson	53	18, 29-21		Rigging up
Grapevine	Kern Line Oil Co., Well	1	19, 11-19	9200	Idle
Kern River	E. A. Bender, Orloff	1	6, 29-28		Location
	Seaboard Oil Corp., Fuhrman	1	21, 28-28		Grade
McClung	Continental Oil Co., KCL	H-1	18, 30-26	8495	Redrilling
	Continental Oil Co., Easton	1	33, 29-26	7448	Drilling
McKittrick	Standard Oil Co., Well	113-7	7, 30-32	2110	Drilling
Mt. Poso	G. C. Nelson, Nelson-Hooper	1	36, 26-27	2340	Fishing
	J. T. Wilcox, Zanetti	1	17, 28-28	3210	Idle
Mt. View	Di Giorgio Fruit Corp., Well	48-10	10, 21-29	6419	Testing
	T.W.A.O. Co., Porter	1	18, 30-29		Location
Poso Creek	Golden Bear Oil Co., New Hope	7	29, 27-27	1815	Drilling
	Pac. West'n O. Corp., Enas Fee	36	21, 27-27	2070	Completing
	Pac. West'n O. Corp., Enas Fee	38A	21, 27-27		Foundation
Rosedale	Western Gulf Oil Co., KCL-A	37-14	14, 29-26		Rig
Round Mt.	Bandini Pet. Corp., Signal Mills	1	24, 28-28	2489	Completing
	Gen. Pet. Corp., Railroad	3	23, 28-28	1680	Drilling
	Harp & Brown, Olcese	2	17, 28-29		Rig
	Signal Pet. of Calif., S. P.	1	25, 28-28		Idle
	The Texas Co., KCL	1-13	13, 28-28		Location
	Wilshire Oil Co., Hartfield	1	32, 28-29		Grade
Shafter	T.W.A. Oil Co., Shafter Comm.	86-7	7, 28-25	9590	Drilling
Stockdale	W.G.O. Co., KCL	77-5	5, 30-27		Grade
Tehachapi	E. G. Cummings, Poor Boy	1	31, 32-32	1411	Idle
Temblor	B. F. Delanty, Well	69-A-1A	36, 29-20	135	Drilling
10 Section	Ohio Oil Co., KCL	J-1	6, 31-26		Grade
	Madera County				
Herminghaus	The Texas Co., Gill	41-17	17, 13-16		Location
Firebaugh	The Texas Co., Moffat	55-7	7, 12-15		Rig

deep test is 993 ft. north and 991 ft. west from the southeast corner of section 5-30s-27e and will be drilled in search of Stevens zone production.

Lanare "Cat" Testing

Amerada Pet. Corp. California Lands No. 65-15, is taking sidewall samples after a formation test of the interval 8015 ft. to 8043 ft. failed to recover either oil or gas. The well is located in section 15-17s-18e about 2½ miles southeast of the Helm field. The hole was drilled and cored to a total depth of 8200 ft. Top of the Kreyenhagen was found at 7760 ft. and the top of the Eocene sand was found at 8022 ft.

Elk Hills "Cat" Suspended

The Pacific Western Oil Corp. has suspended operations on its deep test well, Transport No. 64. Located in section 26-30s-24e, north of the producing limits of the Elk Hills field, the well has been bottomed at 10,555 ft. Drilled as a "no dope" hole there is no information available on sections cored, showings found or the operator's future plans for the project.

McKittrick Test Running Casing

Standard Oil Co. well No. 113-7, is running casing preparatory to making a test of the Olig sand. The hole has been bottomed in brown shale at a depth of 2110 ft. It is reported that a small pumping well is expected from the Olig sand found at this location. The try is located in section 7-30s-22e, northwest of the town of McKitterick.

Raisin City Yet Active

Seaboard Oil Corp. S.T.U. No. 35-13, section 13-15s-17e, is coring ahead in shale with thin streaks of oil sand at 6125 ft. while the operators S.T.U. No. 33-14, section 14-15s-17e is yet a location. The Signal Oil & Gas Co. is rigging up on well No. 73-14 in section 14-15s-17e. In section 13-15s-17e Universal Consolidated Oil Co.'s recently completed Surfluh No. 1, is currently producing 22 barrels per day of 54.5° gravity oil cutting 1.2% flowing through a 20/64-inch bean with 900 pounds tubing pressure and 2100 pounds casing pressure. Gas production is 2,037,000 cu. ft. per day. This operator also is rigging up on Taylor No. 2, near the east ¼ corner of section 14-15s-17e. Northwest of the field, Shell Oil Co.'s San Joaquin No. 2-1, section 9-15s-17e, is drilling ahead in hard brown shale at 6255 ft. At the opposite flank, southeast of the field, the Pauley brothers well No. 21-29, is plugging back and testing by stages from a total depth of 5698 ft. All tests to date have been wet.

Deep Test Continues

Standard Oil Co. Baldwin-Cienega No. 105, deep test well in the Inglewood field, continues to prospect ahead in shale with streaks of gray sand below 11,050 ft. No showings have been found below the Sentous zone. The objective of the well is now the Schist contact, which should be reached in the very near future.

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Tejon Field Development

The development of the Tejon field recently discovered by the Richfield Oil Corp. is getting under way. The operator plans to keep two strings of tools running continuously. In section 35-11n-19w, Tejon No. A-25-35, has been bottomed in gray sand at 2795 ft. and plugged to 2640 ft. A string of 8⅝-inch casing was cemented at 2564 ft. and a 6⅝-inch liner including 73 ft. perforated landed at 2638 ft. The operator is now preparing to place well on pump. Top of the Chanac oil sand was found at 2572 ft. Southeast of this well, Tejon No. B-54-35 has been spudded in and is drilling ahead below 200 ft. South of the discovery well, rig has been erected for Tejon No. A-21-2 in section 2-10n-19w.

West Fellows Well Completed

West of the town of Fellows in section 6-32s-23e, the C. C. M. O. Co. has completed well No. 85-6. On production well flowed at an initial rate of 215 barrels per day, 20.1° gravity oil, cutting 1.5% with 100 pounds flow pressure. The well is producing from the interval 2909 ft. to 3050 ft. South of this well in section 7-32s-23e the Republic Pet. Co. has completed well No. 7-45, pumping 20 gravity oil at a rate of 225 barrels per day. The total depth of this hole is 3050 ft. with zone open to production from 2703 ft. to bottom.

Girard Drills At Rosecrans

P. M. Girard has taken over the old G. M. Russell No. 1, and is cleaning out preparatory to deepening to the Eighth zone. Located on the northeast corner of 135th Street and Broadway, the well was originally drilled to a total depth of 6109 ft. by the General Petroleum Corp. During the last few years the well has been pumped by G. M. Russell. Approximately ½ mile south of this well the Union Oil Co. is preparing to deepen Rosecrans No. 18 to the Eighth zone. This well is located on the southeast corner of Rosecrans Blvd. and Broadway.

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Reports from Washington

(Continued from Page 5)

leum industry executives to formulate national policy for recommendation to the Government.

The committee, headed by John A. Brown, New York president of Socony Vacuum Oil Co., will start its studies immediately, "in preparation for the development of a recommendation for a Government policy fundamentally designed to promote the developing and securing of crude oil reserves and petroleum products the world over in a combined program of war preparedness and maximum progress of petroleum."

Two Californians—Bert Mattei of Honolulu Oil Corp. and W. F. Humphrey of Tide Water Associated—were elected to the 16-man group. Mattei and Humphrey comprised 50% of the California delegation at this month's meeting, with Sam Mosher, of Signal Oil & Gas, and Dana Hogan, Hogan Petroleum Co., coming from Los Angeles.

* * *

Because laughs are scarce in the oil business these days, and because Mr. Ickes has so many other nettling problems at the moment that he probably won't hold it against us if we repeat the story, we will tell about the dirty trick a sassy Washington columnist played upon the Secretary in what Mr. Ickes refers to as the "Patterson Papers".

Recounting in high glee the nefarious way in which he got hold of the highly private home phone number of Mr. and Mrs. Ickes and had an assistant call the Maryland farm to "extend words of cheer" and wishes of recovery from Ickes' recent broken collarbone, the columnist wrote in the Washington Times Herald about his associate's conversation with Mrs. Ickes, in which the associate:

" . . . began to tsk-tsk more sympathy but Mrs. Ickes interrupted.

" 'How,' she demanded, 'did you get this telephone number? It is very private.'

" 'That is all right,' soothed Brown (the associate). 'You may rest assured that your private telephone number, AShton 2831, will go with me to the grave!' "

George Davidson Named Assistant Vice President of Standard

George A. Davidson has been elected assistant vice president of Standard of California, it was announced on Jan. 19 by H. D. Collier, president of the company.

Davidson, formery assistant general manager of the manufacturing department, was graduated from the University of California in 1920 with a B.S. in chemistry. With the oil company for the past 23 years, he has held key position at Standard's Richmond refinery and has been superintendent of the El Segundo refinery. He was transferred to the company's San Francisco headquarters in 1937.

J. P. Butler

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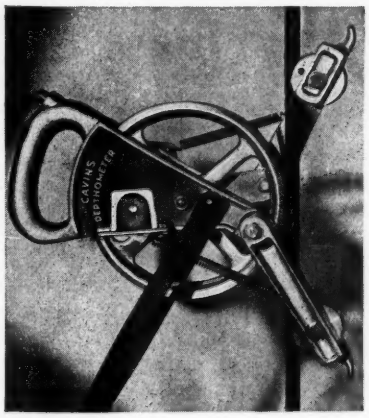

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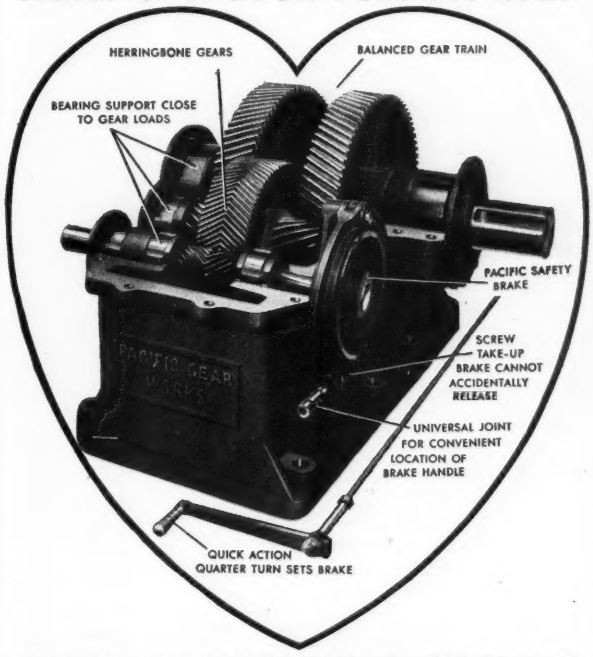
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Oil Shale a Source of Petroleum Products

(Continued from Page 11)

the retorts. Questions which oil tool manufactures might well be considering right now are: If shale-mining develops, do we have equipment which is readily applicable? What changes is present equipment, or new developments, are necessary to supply special tools? It may be none to early to consider such questions seriously.

Refining Problems

Many of the refining problems seen years ago require handling in the light of the best petroleum processes. Methods should be developed for the removal of the color and gum-forming compounds without removing desirable constituents. Efficient retorts, acid recovery and sludge utilization require attention. Coke problems and whether or not to hydrogenate the unsaturated fractions also remain to be solved.

Research should also be directed further into the determination of the nature of the oil-producing material in shales, and the manner in which it decomposes to form oil. The nature of the oil and gas obtained by retorting shales under various conditions should be expanded. Catalytic processes can open an entirely new approach in this direction.

Whatever the future holds for the nation's oil supply, one fact is certain: The petroleum technologist and refiner can bring to the shale-refining problem a wealth of knowledge which can assure a satisfactory outcome.

P.A.W. Report

(Continued from Page 23)

The Permanent Commission should serve as a continuing agency with the following functions: (a) to give effect to policies adopted by the General Conference, (b) to handle specific matters assigned to it by the General Conference or by international conventions, and (c) to develop policies and prepare programs for submission to the General Conference for the constructive application of the International Oil Compact.

5. THE INTERNATIONAL OIL COMPACT should provide that the General Conference shall establish a budget for each biennial period and determine the contributions to be made by the adhering countries and by the industrial organizations represented in the Permanent Commission, and that the expenses of the General Conference, the Permanent Commission, and the Technical Institute shall be met from the budget fixed by the General Conference.

6. THE INTERNATIONAL OIL COMPACT should provide that the Permanent Commission shall create in connection with the Technical Institute an arbitral tribunal to which disputes may be referred by agreement of the parties whether the parties are government or oil companies. It should also provide that any dispute between adhering countries, with reference to the interpretation or application of the provisions of the Compact or of any conventions concluded under it may be referred, by application of any party to the dispute, to the Permanent Court of International Justice for decision; that any such dispute between an oil company and an adhering country may, after the exhaustion of the local remedies provided by the law of the latter, be brought to the attention of the government of the country of which the company is a national; and that any such dispute between two or more oil companies may be referred by any party to the dispute to the Technical Institute for disposition according to a procedure to be laid down by the Permanent Commission.

BUY

WAR BONDS

U. S. Steel Corp. Buys 4th War Bonds

United States Steel Corporation and subsidiary companies will purchase United States Government Securities amounting to $75,000,000 during the Fourth War Loan Drive, Irving S. Olds, Chairman of the Board of Directors of the United States Steel Corporation, announced today.

The subscription will be allocated in proportionate amounts for credit to the districts in the United States in which the corporation operates.

Visco Products Company, Inc., of Houston, Texas, has just announced the opening of California offices at Los Angeles and Long Beach.

These offices will be in charge of Mr. Jim Chescheir as sales and service engineer and Mr. E. T. Kocher in charge of research.

The Long Beach office is located at 2344 Orange Avenue and the Los Angeles office at 2870 Avenel Street.

"Simplified Petroleum Chemistry and Physics"

A novel picture book with simple explanations dealing with the highly technical subject of petroleum chemistry and physics as applied to lubricants and fuels has just been published by Petroleum Educational Institute, Los Angeles, under the title as above.

The purpose of the book is to reduce to elementary, A. B. C. language those fundamentals of chemistry and physics, a knowledge of which, service and salesmen of modern lubricants and fuels MUST possess if they are to understand and intelligently apply these products in late model internal combustion engines to secure maximum efficiency and minimum cost of operation.

Here is a job that we wouldn't like. In a small town in New York, there is a firm of brave men who spend their time milking skunks for oil of skunk which is used as a fixative in perfume. This is due to the war scarcity of ambergris and musk, long the basic ingredients in perfumes.